The Canadian Medical Association Journal

FEBRUARY, 1952 • VOL. 66, NO. 2

CEREBRAL FAT EMBOLISM*

An Unusual Case with Recovery

JOHN KERSHMAN, M.D.† and
FUAD HADDAD, M.D., *Montreal*

CEREBRAL FAT EMBOLISM is an unpredictable calamity and its mechanism is still uncertain. The case to be reported teaches some important lessons.

S.M. was a rather obese boy, aged 12½ years, who went horseback riding on September 3, 1950. After he dismounted, at about 12.30 p.m., the horse reared and kicked him in the right forearm. The boy was knocked down but did not strike his head; there was no laceration of the skin nor loss of consciousness. He walked back to his car, was driven home and then to the hospital where he was admitted at 1.00 p.m. An x-ray revealed fractures of the distal one-third of the right radius and ulna, with marked over-riding of the fragments.

At 1.45 p.m. he was given codeine grains ½ and atropine grains 1/200, and at 1.55 anæsthesia was started, consisting of a mixture of cyclopropane and nitrous oxide with oxygen. The arm was manipulated. The anæsthesia was so light that during the procedure movements were noticed in the other arm. It was difficult to reduce the deformity and to maintain it in the proper position. At 2.15 p.m., during manipulation and while a plaster cast was being applied, the patient's breathing suddenly became moist and noisy. The anæsthesia mask was removed and it was noted that he was cyanosed and had stopped breathing. Cyclopropane and nitrous oxide were stopped, an airway inserted, oxygen forced, and artificial respiration started immediately. Normal colour returned in a few moments and after 4-5 minutes of artificial respiration breathing became spontaneous. The oxygen was continued, 3 c.c. of coramine were given intravenously and examination of the chest revealed moist, bubbling râles but these quickly disappeared.

The patient then became extremely restless, thrashing his limbs about. This continued for 2-3 hours despite the administration of 1½ grains sodium amytal intramuscularly. At 4.30 p.m. he was returned to the ward and was kept in an oxygen tent. At 5 p.m. he had dilated pupils, equal in size, responding faintly to light. There was slight right lower facial weakness and he responded to painful stimuli. There was some increase in tone on the right side but deep reflexes were symmetrical; the abdominals were active and plantars were questionable because of gross withdrawal responses. At 8 p.m. the plantar response on the right side was extensor, on the left it was normal; the abdominal and corneal reflexes were absent. During the examination a convulsion occurred.

When the senior author first saw him, at 8.30 p.m., the patient was unconscious, and he continued to have spells of restlessness every few minutes. At 9.30 p.m. he was catheterized and the urine was examined for fat but none could be definitely identified.

On the third day after the accident the patient was less restless, and both plantar responses were extensor. The temperature went up to 105° that afternoon. X-ray of the chest showed a shift of the heart to the right and elevation of the right diaphragm, suggesting some atelectasis of the right lung. On the fourth day there were two episodes of decerebrate rigidity. On the fifth day a spinal puncture was done. The initial pressure was 190 mm. of water, the Pandy was negative, the protein was 57 mgm. %, sugar and chlorides were normal.

During the sixth day coma deepened and there were many attacks in which the patient would cry out. His body went into generalized tonic spasms with the neck and head retracted, and each spell lasted about half a minute. One attack began with twitching of the fingers of the right hand. In addition, there were coarse athetoid and tremor-like movements of the left arm. The temperature rose again to 104°. The blood calcium level at this time was normal. Daily examination of the urine showed occasional red and white blood cells and occasional granular casts. The white blood count, which had been 18,600 on the third day, gradually came down to 9,500 and temperature also subsided.

The frequent attacks of decerebrate rigidity and coarse tremors were controlled by intravenous tridione in doses of 7½ to 15 grains. Fluids were given by nasal tube as well as intravenously. The first E.E.G. was done at this time.

On September 10, seven days after the accident, many different kinds of attacks continued to occur, with head and eyes turning to either side. These gradually diminished during the next week. Ten days after the accident the corneal reflexes returned, and three days later the opisthotonic spells stopped. The patient began to take fluids again by means of a bottle and nipple. On the 16th day he responded to loud sounds by turning his head, and the next day he smiled for the first time. On the 22nd day he could chew solid food, and opened his mouth and put his tongue out in response to a command. On the 24th day he began to say some words, and the next day he was able to answer simple questions and to count. Shortly thereafter the oxygen tent was removed and the other prophylactic measures, such as intramuscular penicillin, were discontinued. He still continued to receive large amounts of vitamin B complex and nicotinic acid.

Fifty-three days after the accident he walked without assistance. His gait was jerky, with festination and propulsion typical of Parkinsonism, and his speech was slurred. Artane, pyribenzamine and hyoscine hydrobromide were all tried, with questionable effect. A pneumogram on October 31 showed slight ventricular dilatation.

On November 25 an I.Q. was done. His score on the Sanford-Binet scale was 97. Nine months after the accident his I.Q. was 112, his speech was clear and almost normal, finger movements were much better and only occasional choreiform movements occurred. The E.E.G. showed occasional slow waves, with a very well organized alpha rhythm. One year after the accident, the patient was back at school and was doing well. He was playing table tennis without difficulty.

*From the Department of Neurology and Neurosurgery, McGill University, and the Montreal Neurological Institute.
Read at the Annual Meeting of the Canadian Neurological Society in Toronto, June, 1951.
†The sudden and painful loss of Dr. Kershman, who died on June 27, 1951, from a heart attack, determined the junior author to publish this paper with only minor changes, in memory of his teacher and friend. This paper was the last contribution by Dr. John Kershman.

Canad. M. A. J.
Feb. 1952, vol. 66

DISCUSSION

The differential diagnosis lies between cerebral anoxia and cerebral fat embolism. Since we were not able to identify fat droplets in the urine or emboli in the retinal vessels, diagnosis of fat embolism can only be made by inference. In the last analysis, the effect of multiple fat emboli in the brain is to produce circulatory impairment and resultant anoxia, so that the clinical and pathological end results are similar in both instances.[1] It may be of value, however, to review the reasons why we feel that the events can best be explained by fat embolism.

Anæsthesia was comparatively light. Although the patient was cyanosed and stopped breathing, the total period of possible anoxia was short—perhaps not more than two minutes. The transient signs of pulmonary œdema, relatively light unconsciousness at the start which gradually deepened in 5-6 days, the occurrence of varied convulsions starting on the 4th day and lasting for about a week thereafter, all of these events suggest a cerebral circulatory block with progressive anoxia, such as might be caused by fat emboli scattered through the brain. The occurrence of transient lung atelectasis on the third day and the elevated white blood cell count are also suggestive of fat embolism.

Perhaps the most unusual feature of this case is the remarkable degree of recovery considering the extent of the cerebral injury.

The E.E.G. findings deserve special mention (see Fig. 1), since we have been able to find only one other case of fat embolism where such records have been made.[8] The first E.E.G., done on the 6th day, showed a complete absence of alpha rhythm and a generalized dysrhythmia. Two to three per second high voltage waves were recorded from the occipito-parietal regions and 5-6 per second high voltage waves from the fronto-central regions, with occasional 2-3 per second waves. These were not bilaterally synchronous and many random waves appeared, all having the same general pattern. Tridione was given intravenously, and although some alterations were noticed in the pattern of the tremor this did not change the electroencephalographic picture.

The second E.E.G., taken two days later, showed a slightly faster rhythm (1.5 to 2.5 per second waves instead of the 2 to 3 per second, and 4 to 5 per second instead of the 5 to 6 per second waves). Painful stimuli seemed to diminish the slow wave activity. The voltage was generally lower than the first one.

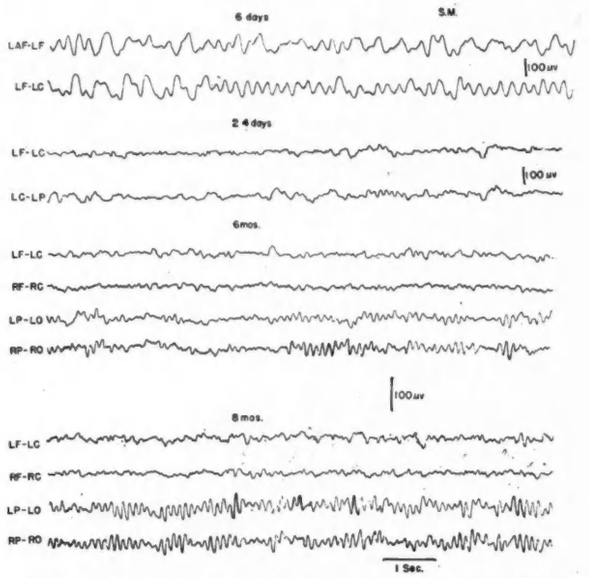


Fig. 1.—Representative tracings of the electroencephalograms taken 6 and 24 days and 6 and 8 months following the accident.

On the 13th post-injury day the appearance, during sleep, of nearly normal sleep rhythm was striking. On the 18th day, the voltage of the generalized slow wave activity had further diminished, and a more rapid rhythm was observed. At this time the patient was responding to loud sounds. On the 24th day the recording showed an even lower voltage of the slow wave activity with appearance of a more organized background.

The E.E.G. taken on the 38th day, despite the persistence of 6 per second medium voltage waves, showed bilateral symmetrical alpha waves. On the 71st day the record showed a more stable background with normal alpha rhythm and diffuse slow wave low voltage activity. Hyperventilation gave a normal response. Six months after the injury the E.E.G. was normal, with the exception of a few random slow waves appearing in all leads. It is interesting to note that clinical improvement appeared long before it was recorded in the E.E.G.

How fat embolism occurs, and how the emboli reach the brain, is still an unsettled problem. The syndrome may occur not only from fractured bones, but has been reported as the result of bruises in fat people with dislocation of the subcutaneous fat, and also in several other conditions such as burns, infections, lipæmic states, etc.[3] It is not certain whether an excessive amount of non-emulsified fat circulates through

the blood and lymphatics and then reaches the brain via a patent foramen ovale, or whether it is squeezed as tiny droplets through the lung capillaries, coalescing later in the cerebral circulation.[5] Lehman and Moore[4] have advanced the suggestion that some substance may be liberated in the blood due to trauma, causing the normal circulating fat to precipitate or coalesce in droplets.

The proof of fat embolism is not a simple matter. Quantitative blood fat determinations are of no value.[9] In the examination of the urine only the last few c.c. of a catheterized specimen may reveal fat globules. The Sudan III stain must be fresh, a high concentration of the dye is necessary, and it must be permitted to act for at least five minutes.[9] Recently it has been shown that testing the sputum is also unreliable since fat globules may be present in many other conditions such as tuberculosis, pneumonia, etc.[2]

There is no specific treatment. Most authors stress the importance of prophylaxis, such as the avoidance of rough handling of patients or unnecessary manipulation. The use of agents to saponify fat has been suggested but no satisfactory agent has been introduced, though the most recent one of sodium dehydrocholate[6] may have some promise. In a recent review, Rowlands and Walkeley[7] have stressed the value of oxygen, and in the present case we feel that this contributed greatly to the unusual degree of cerebral recovery. We also believe that intravenous tridione was of great help in controlling seizures. It is of interest that our patient is now without sedatives and that no further convulsions have occurred.

REFERENCES

1. CAMMERMEYER, J.: *Acta Psychiat. et Neurol.*, **12**: 333, 1937.
2. FLOURNOY: Paris, 1878. Cited by Groskloss.
3. GROSKLOSS, H.: *Yale J. Biol. & Med.*, **8**: 59, 175 and 297, 1935-36.
4. LEHMAN, E. P. AND MOORE, R. M.: *Arch. Surg.*, **14**: 621, 1927.
5. NIGHTINGALE, H. J.: *Brit. M. J.*, **2**: 531, 1945.
6. RAPPERT, E.: *Deutsche Ztschr. f. Chir.*, **250**: 276, 1938; Abst. *J. A. M. A.*, **111**: 212, 1938.
7. ROWLANDS, R. A. AND WAKELEY, C. P. G.: *Lancet*, **1**: 502, 1941.
8. SCHWAB, R. S. AND BOURNE, G. C.: *E.E.G. Clin. Neurophysiol.*, **1**: 252, 1949.
9. SCUDERI, C. S.: *Surg., Gynec. & Obst.*, **72**: 732, 1941.

A FOLLOW-UP STUDY OF JUVENILE DIABETICS*

ROBERT B. KERR, M.D.,† GORDON D. BROWN, M.D.‡ and NORMAN KALANT, M.D.,¶ *Toronto*

AS THE VARIOUS eras of treatment of diabetes mellitus have come and gone, there have been numerous studies made to determine the course and outcome of this disease, and to ascertain the effects of treatment. It is interesting to follow the history of the disease when it begins in childhood, since degenerative complications, especially vascular changes, commonly occur prematurely in diabetic patients. These early complications are best studied in young people; one is then able to study degenerative cardiovascular changes before the appearance of more diffuse ageing processes.

As with most aspects of this complex condition, there is no unanimity of opinion regarding either the course of the disease or the effect of treatment. While some hold forth a gloomy prognosis for all patients,[1] others offer hope to those who will be conscientious and persevering in following the prescribed treatment.[2] The truth of the matter is not yet known.

It was with this controversy in mind that a follow-up study was made on a group of young diabetics seen at the Toronto General Hospital. Some of these patients were in the group previously reported on by Chute[3] at the Hospital for Sick Children, Toronto. Eighty-one patients were available for adequate study. This consisted of a detailed history and functional enquiry, routine physical examination, including fundoscopic examination by an ophthalmologist, electrocardiogram, x-rays for evidence of vascular calcification in the lower limbs and pelvis, and capillary fragility tests. Determination of blood sugar, non-protein nitrogen and cholesterol fractions were done routinely; in some, serum proteins were also measured. When indicated special procedures were used, including electroencephalography and renal clearance tests.

*From the Department of Medicine and the Banting and Best Department of Medical Research, University of Toronto and the Diabetic Follow-Up Clinic, Toronto General Hospital.
This work was supported by a grant from the Canadian Life Insurance Officers Association.
†Formerly Head of Therapeutics, Department of Medicine, University of Toronto, Toronto, Canada.
‡Medical Research Fellow, Department of Medicine, University of Toronto, Toronto, Canada.
¶Medical Research Fellow, National Research Council, Canada.

Only those patients were included who had been found to have diabetes before the age of 16 years. The sex and age distribution, duration of diabetes and estimate of control of diabetes is shown in Table I. It was felt that this particular group was of special interest since all but three patients had been treated entirely during the insulin era. Thirty-six patients (44%) gave a hereditary and/or a familial history of diabetes.

It was found that 27 patients were on a weighed or carefully measured diet, of whom 17 were taking over 200 grams of carbohydrate, 5 were taking 100 to 200 grams of carbohydrate and 5 were taking a high fat diet with less than 100 grams of carbohydrate daily. Thirty-three patients were taking a relatively constant daily carbohydrate intake of varying amounts, while the remaining 21 patients were on a free diet. These patients were probably taking a moderate or high carbohydrate intake. The reason for the apparent disregard of diet is not obvious; it may be related to the age of the patients, many being adolescents going through the stage of rebellion against dietary and other restrictions associated with parental authority. In the older patients, it may be due to a reaction against the marked carbohydrate and caloric restriction used in the early stages of their treatment.

TABLE I.

THE SEX AND AGE DISTRIBUTION, DURATION OF DIABETES AND DIABETIC CONTROL IN 81 JUVENILE PATIENTS

Duration of diabetes	*0 - 9 years*		*10 - 14 years*		*15 - 19 years*		*Over 20 years*		*Total*	
Diabetic control	good	poor	good	poor	good	poor	good	poor	good	poor
Number of cases	6	12	10	9	6	10	10	18	32	49
Males	3	9	4	2	4	5	7	12	18	28
Females	3	3	6	7	2	5	3	6	14	21
Average age	17	18	19	21	24	24	33	30	23	23
Average duration of diabetes	5	6	12	12	17	17	24	23	15	15

All patients were taking insulin; the average insulin requirement for the whole group was 55 units daily but individual dosages varied widely. It was not felt advisable to classify the severity of the diabetes on the basis of insulin requirement because of the wide variations in diet and exercise in the group.

Diabetic control.—It is a difficult task to grade the quality of control of a diabetic. Information is obtained from blood sugar estimations, urinalyses, presence or absence of episodes of acidosis, attention to diet, and presence or absence of adequate medical attention. When a patient has attended clinic for many years, most of this information is readily obtainable. However, when the patient is seen infrequently the information is incomplete, and grading depends largely on the patient's word to the doctor. This was the case with some of our patients. Consequently, it was felt unjustifiable to attempt any detailed classification or make use of complicated "control indices" or other such formulæ. Instead the patients were divided into two groups—those who were labelled well controlled, and those who were not. In the former group were those who had come closest to attaining physiological normality over the whole duration of their diabetes. The other group included the remainder—those whose control was only fair or bad.

An average of fasting blood sugar tests over 150 mgm. % (Folin-Wu) and more than occasional urinalyses with two plus glycosuria were felt to be beyond the limits of physiological control. Frequent episodes of acidosis were evidence of poor control, especially if precipitated by neglect, but one or even two episodes of acidosis under exceptional circumstances, for example in the presence of a severe infection, were not considered sufficient reason *per se* to exclude an individual from the well controlled group if, apart from those occurrences, his control was satisfactory for a long period of time.

It was felt that constancy of dietary intake regardless of the type of diet was of great importance in attempting to gain physiological control, though it did not guarantee that this goal would be reached. The frequent adjustment of the insulin dosage over the years to meet the changing requirements of growth, occupation and exercise habits was essential to good control; the conscientious application of a good diabetic education to treatment was also important.

The criteria for describing control were somewhat flexible, and classification on such grounds may be subject to "impressions" on the part of

the examiners. This danger was well recognized and a constant attempt made to avoid it. Each person was classified with regard to control only after thorough and repeated reviews of the case histories. It was concluded that 32 patients were eligible for the "good control" group while the remaining 49 were placed in the "poor control" group.

COMPLICATIONS

Since in recent years, the complications are assuming the major rôle in the production of morbidity and mortality among diabetics, a survey of these secondary conditions is a prerequisite in determining the effect of treatment. Much of the examination of the patients was an effort to find these states by any means possible and preferably at an early stage in the course of their development. The complications sought for were those commonly accepted as being associated with diabetes—retinopathy, arteriosclerotic heart disease, renal disease, peripheral arteriosclerosis, peripheral neuropathy and skin disease. Coma due to ketosis is a preventable and curable outcome of uncontrolled diabetes rather than a true complication and consequently will not be considered further. A search was made for any relation between the incidence of complications and any possible influencing factors.

It has frequently been demonstrated that the incidence of complications increases with the duration of the diabetes and that a diabetic almost invariably sooner or later shows some form of degenerative vascular lesion, regardless of age. This deleterious effect of the years is well shown in this group. In Table II, it is seen that the total number of complications as well as the incidence of each type of complication increases as the disease progresses. The exceptions to this rule are the skin lesions. This relationship to duration of diabetes has been the basis for much controversy. It has led Dolger[1] to an attitude of gloomy fatalism concerning the eventual outcome of all patients regardless of treatment. It has led Dry and Hines[4] to the opinion that diabetes and vascular diseases are both manifestations of a single basic disorder. However, Root[5] believes that excessive vascular disease in young diabetics is the result of uncontrolled diabetes. This suggests the possibility that disordered tissue metabolism constituting the diabetic state is causally related to the vascular changes. If this is so, one might expect that the blood vessels would suffer to a greater extent in patients with the most constantly abnormal metabolism; that is, in those who are poorly controlled.

TABLE II

THE INCIDENCE OF COMPLICATIONS RELATED TO DURATION OF DIABETES IN 81 PATIENTS

Duration of diabetes	*0 - 9 years*	*10 - 14 years*	*15 - 19 years*	*Over 20 years*	*Total cases*
Number of cases	18	19	16	28	81
Retinopathy	2	7	11	21	41
Cardiac	0	0	1	6	7
Renal	1	0	3	7	11
Vascular calcification	0	1	0	12	13
Neuropathy	0	1	2	5	8
Skin	2	1	3	2	8
Other	0	2	0	1	3
Number of patients with complications	4	9	12	24	49
Number of patients free from complications	14	10	4	4	32

In Table III the patients in each duration range have been divided into the two control groups. It is seen that in every range, the incidence of each complication is higher in the poorly controlled subjects. Of great importance is the observation that after 15 or more years of diabetes 6 of 16 well controlled patients remained free of any clinical evidence of degenerative change, while only 2 of 28 poorly controlled patients were in this fortunate condition. Though the number of patients in some age groups in small, the trend is obvious and too marked to be ignored. It appears that poor diabetic control results in the more frequent and earlier occurrence of complications while adequate control offers protection against these secondary changes.

The question then arises as to whether the ill effects of poor control are associated with long continued hyperglycæmia and glycosuria or with the more marked biochemical disturbances occurring during episodes of acidosis. The occurrence of complications in 45 patients who had experienced acidosis, and in 36 patients who gave no history of acidosis was compared. There was no significant difference in the incidence of complications in the two groups. It is concluded

that the severe changes of acidosis *per se* are not responsible for complications, but rather the milder, but persistent chemical abnormalities of poor control.

Retinopathy.—Diabetic retinopathy was the most common complication seen in this series. Forty-one patients showed retinal lesions considered characteristic of diabetes. The average age of those affected was 27 years and the average duration of diabetes 19 years. The shortest duration at which retinopathy was found was 6 years. Of the 41 cases, the diabetes was considered poorly controlled in 29 and well controlled in 12. Only 4 patients with retinopathy had associated hypertension.

TABLE III.

INCIDENCE OF COMPLICATIONS RELATED TO DIABETIC CONTROL AND DURATION OF DIABETES IN 81 PATIENTS

Duration of diabetes	*0 - 9 years*		*10 - 14 years*		*15 - 19 years*		*Over 20 years*		*Total*	
Diabetic control	good	poor	good	poor	good	poor	good	poor	good	poor
Number of cases	6	12	10	9	6	10	10	18	32	49
									100%	100%
Retinopathy	0	2	2	5	4	7	6	15	12	29
									38%	59%
Cardiac	0	0	0	0	0	1	1	5	1	6
									3%	12%
Renal	0	1	0	0	0	3	2	5	2	9
									6%	18%
Vascular calcification	0	0	0	1	0	0	2	10	2	11
									6%	22%
Neuropathy	0	0	0	1	0	2	1	4	1	7
									3%	14%
Skin	0	2	0	1	0	3	0	2	0	8
									0%	16%
Other	0	0	1	1	0	0	0	1	1	2
									3%	4%
No. of patients with complications	0	4	3	6	4	8	6	18	13	36
									41%	73%
No. of patients free from complications	6	8	7	3	2	2	4	0	19	13
									59%	27%

White[6] in a study of juvenile diabetes of 15 years' duration, found arteriosclerosis to be the most frequent retinal change. However, diabetic retinopathy, in the absence of arteriosclerosis and hypertension, has been frequently reported in young diabetics.[7, 8] In this series, the lesions most commonly seen were the small microaneurysms of the capillaries described by Ballantyne[9] and small round deep hæmorrhages in the presence of perfectly normal retinal vessels. In the more advanced cases, solid, waxy, sharply defined exudates and larger hæmorrhages were seen; in a few cases there was associated arteriosclerosis.

Although these lesions were often minimal and sometimes disappeared completely, they cannot be disregarded, for they tend to progress. Small hæmorrhages are later associated with waxy exudates, and eventually massive vitreous hæmorrhage with scar formation (retinitis proliferans) may appear. The associated symptoms depend upon the state of the macula and in this series there were only three patients with well marked visual impairment, macular sparing until late being characteristic of the group. It is unfortunate that the retinopathy is often far advanced before the development of a visual disturbance impresses upon the patient the need of good diabetic control.

Because congenital cataracts might occur in these age groups, it was impossible to state categorically that lens changes in a given individual were secondary to diabetes. It is interesting to note, however, that five patients had varying degrees of lens opacity, and of these, 2 had marked visual impairment.

The significance of an increased capillary fragility and its relation to retinopathy is not yet understood. Root and Rodriguez[10] maintain that a change in capillary fragility occurs in from 5 to 12 years from the time of onset of diabetes and is frequently associated with beginning evidences of vascular diseases. Dolger,[11] however, did not observe a correlation between the occurrence of retinopathy and increased capillary fragility. For this series, Table IV shows the association of diabetic retinopathy and capillary

TABLE IV.

DIABETIC RETINOPATHY AND CAPILLARY FRAGILITY IN 80 JUVENILE PATIENTS

	Diabetic retinopathy	
	Present-number of cases	*Absent-number of cases*
Increased capillary fragility	17 (21%)	3 (4%)
Normal capillary fragility	24 (30%)	36 (45%)

fragility measured by the Gothlin[12] method. Retinopathy was associated with increased fragility in 17 patients with an average age of 30 years and average duration of diabetes of 21 years. Retinopathy with normal fragility occurred in 24 patients with average age of 25 years and average duration of diabetes of 18 years. Of the 20 patients with increased capillary fragility, 17 had retinopathy. These findings would suggest that diabetic retinopathy is usually present prior to the development of an increased capillary fragility. In several patients there was found to be an elevation of the Gothlin Index soon followed by retinal changes appearing for the first time. However, there were also patients seen in whom the retinopathy preceded the appearance of increased fragility. An interesting feature noted in several patients was the spontaneous reversion of an elevated Gothlin Index to normal.

Cardiac disease. – Varying degrees of heart disease were observed. Two patients had abnormal electrocardiograms indicating myocardial damage; one of these occurred during the exercise test for coronary insufficiency.[13] One patient had cardiac enlargement resulting from hypertension of renal origin. Four patients were proved to have had myocardial infarctions with typical electrocardiographic changes. All had had diabetes for 15 years or more, three for 20 years or more. Three were poorly controlled and one was well controlled. It should be noted, however, that the last mentioned patient gave a family history of myocardial infarction occurring at any early age. Three of the four patients were considered to be overweight. The ages at the times of infarction in three males were 28, 32, and 36 years, one female suffered an infarction at age 22 after only 15 years of diabetes. Three of the patients survived the initial attack.

Renal disease.—Kidney disease according to White[6] "is the first (complication) in clinical importance as a cause of morbidity and of mortality". In this group, eleven patients had definite evidence of kidney disease. Ten had had their diabetes for more than 15 years, 7 for 20 years or over. Nine were considered to have been poorly controlled; two who were well controlled were both in the over twenty year duration group.

The renal abnormalities varied greatly in severity. Decreased glomerular filtration and filtration fraction were demonstrated in one patient by clearance tests in the absence of other evidence of renal disease. One subject gave a characteristic history and the typical urinary findings of chronic glomerulo-nephritis. Three patients with persistent albuminuria and retinopathy and a fourth with albuminuria alone, had no other clinical or urinary abnormalities, nor was their NPN elevated.

The remaining five patients had the clinical and laboratory findings usually considered to be associated with intercapillary glomerulosclerosis, with hypertension, retinopathy, œdema and albuminuria. Two had hypoproteinæmia, and three had doubly refractile bodies in the urine. These patients were all in the poorly controlled group and had had diabetes for more than 20 years. The incidence of the clinical syndrome of intercapillary glomerulosclerosis in patients with diabetes of 15 years or more was 11%. The incidence of intercapillary glomerulosclerosis on pathological examination in a similar group of patients[6] however is reported as 100%. This divergence emphasizes the fact that pathological changes must be advanced before producing clinical signs or symptoms.

Peripheral vascular calcification. – In this series, x-ray studies with soft tissue technique for evidence of vascular calcification in the pelvic and leg vessels were carried out routinely. Vascular calcification was found in 13 cases; diabetes had been present for only 11 years in one case, while in the remainder it had been present for 20 years or more. One of the latter group, however, required treatment for peripheral vascular disease after only 10 years of diabetes. Eleven of the 13 patients were in the poorly controlled group.

Root and Millard[14] have shown by pathological study of young diabetics that by the time that medial calcinosis of the limb vessels is seen on x-ray examination, atherosclerosis and arteriosclerosis in other parts of the body is usually present. Thus the finding of vascular calcifica-

tion while not necessarily indicative of occlusive disease in the affected vessels, does imply atheromatous vascular disease elsewhere. This method of examination is therefore felt to be of considerable value. Dolger[15] feels that vascular calcification appears later than hypertension and albuminuria; in this group, however, vascular calcification appeared more frequently than evidence of cardio-renal disease, being second only to retinopathy.

Neuropathy.—There were 8 patients who had evidence of a peripheral neuropathy considered secondary to diabetes. All had impaired or absent knee and ankle tendon reflexes and diminished sensation over feet and legs. One patient developed motor weakness in addition, characterized by an unilateral foot drop. One male patient also had persistent diarrhœa for which there was no obvious cause; and a female patient had intermittent dysuria and weak urinary stream with several episodes of acute urinary retention. These may be cases of neuropathy of the autonomic nervous system as suggested by Rundles.[16] All but one of the eight cases with neuropathy were poorly controlled; five of the eight were in the over twenty year duration group. In one case, the neuropathy improved markedly with establishment of improved diabetic control.

Skin disease.—There were two patients, both females, showing typical lesions of necrobiosis lipoidica diabeticorum. Both were in the 15 to 19 year duration group, control was poor in both; blood cholesterols were 170 and 265 mgm. % respectively. Six other patients had had recurrent skin infections considered more severe and of greater frequency than might be expected in non-diabetics. All of those with skin disorders were poorly controlled.

Other complications.—The danger of cerebral damage resulting from hypoglycæmia has been stressed.[17] Though mental deficiency was seen in several patients, in only one case could it be related with any certainty to diabetes. This patient had a normal development history prior to the discovery of diabetes. Thirteen years later, however, after many severe convulsive seizures, usually associated with hypoglycæmia, he was considered to be of subnormal intelligence. An electroencephalogram record was of an immature type.

Two male patients were felt to have experienced delayed body development and maturation as a result of diabetes. Both were poorly controlled. One remained stunted and subsequently died from cardio-renal complications. The other patient, after the diabetes was adequately controlled, rapidly gained in weight and height and developed secondary sex characteristics.

THE LONG DURATION WELL CONTROLLED GROUP

Ten patients who had survived 20 years of diabetes and were well controlled are of special interest. All were apparently in excellent health. Four of these patients were free of any complications demonstrable by the methods of examination used. They were on constant daily carbohydrate intakes; three took separate daily doses of protamine zinc and regular insulin, the fourth took two injections of regular insulin daily; all did urine sugar tests one to three times daily and adjusted the insulin dosage to keep as constantly sugar-free as possible. Two other patients on similar regimens had only minimal retinal changes. The remaining four patients all had early retinal changes; three had laboratory evidence of early cardiac or renal disease and the other showed peripheral vascular calcification on x-ray.

Statistics cannot convey the obvious differences in general health and well being experienced by these ten patients as compared with those who were poorly controlled.

CO-EXISTENT CONDITIONS

Five patients exhibited diseases not related to diabetes mellitus. There were single instances of spastic quadriplegia secondary to birth injury, cœliac disease, icthyosis, psoriasis and Laurence-Biedl-Moon syndrome. The last mentioned condition was in a boy who developed diabetes at age twelve. There were also seven patients with mental deficiency not definitely related to diabetes or its treatment; an eighth patient with mental deficiency considered secondary to hypoglycæmia has been discussed. Three other patients had abnormal electroencephalograms; one of these, who showed retarded development and a labile diabetes with frequent epileptic convulsions, was improved with dilantin therapy.

There were several conditions more directly related to diabetes. Mild obesity was seen in nine patients. Four cases had had one or more episodes of cystitis, pyelitis, pyelonephritis and

perinephritic abscess. Three patients required sanatorium treatment for pulmonary tuberculosis; a fourth had tuberculous tracheobronchial lymphadenitis, and a fifth showed three soft pulmonary tuberculomas at post-mortem examination.

CHOLESTEROL STUDIES

The rôle of hypercholesterolæmia in the pathogenesis of atherosclerosis has been widely disputed. There has been much controversy about both the cause of hypercholesterolæmia in diabetes and its effect on the blood vessels. With regard to the former, there appear to be two schools of thought. Rabinowitch[18] has long maintained that high blood levels of cholesterol result from increased cholesterol intake in the form of high fat diets. Others have felt that blood cholesterol is not related to dietary intake but rather that high blood levels are associated with poor control of the diabetes. With regard to the relation of cholesterolæmia to atherosclerosis, it may be noted that elevated serum cholesterol values are not always accompanied by atheroma but in disease characterized by hypercholesterolæmia, the incidence of vascular disease is increased.[19]

Blood cholesterol determinations according to the method of Schonheimer and Sperry were made for 74 patients. The association of blood cholesterol with diabetic control, duration, cardio-vascular-renal disease and retinopathy was compared. A significant elevation of the average maximal blood cholesterol values was not seen in association with any of these factors with the exception of renal disease. The tendency for elevated blood cholesterol levels in renal disease associated with diabetes has been noted by Mann.[20]

TABLE V.

SUMMARY OF 23 PREGNANCIES IN NINE DIABETIC WOMEN

Diabetic control	*Good*	*Poor*
Number of women	4	5
Average of ages at terminations of pregnancies	28	24
Average of durations of diabetes at terminations of pregnancies	19	16
Number of pregnancies	10	13
Abortions	0	9
Fetal and neonatal deaths	1	2
Living children	9	2

DIABETIC PREGNANCIES

Of the 81 patients, 15 men and 16 women were married. Nine of the men had become fathers, and nine of the women had had a total of 23 pregnancies (Table V). There were a total of nine abortions, three being indicated for therapeutic reasons. Two neonatal deaths occurred following premature labour and there was one fetal death *in utero* at term coincident with maternal acidosis. Nine of the eleven living children were delivered by Cæsarean section. Average birth weight of the living children was 8.5 pounds.

The very low fetal survival rate (10%) in pregnant diabetics showing calcified pelvic vessels has been reported.[6] None of the above patients showed such vascular calcification.

FATALITIES

Four patients died while under observation. All were badly controlled; the average age at death was 29 years and the average duration of diabetes was 22 years. Two died out of hospital and though the circumstances of their demise are not known in detail, it is felt that they succumbed to renal disease which was very evident at the time of their last clinic visits. The others died in hospital and post-mortem examination was performed. One 35-year old man after 23 years' duration of diabetes experienced a fatal myocardial infarction. The autopsy diagnoses were atheroma of the coronary arteries, recent myocardial infarction, atheroma of the aorta, Monckeberg's sclerosis of the dorsalis pedis arteries, tuberculomata of the lung, hyaline thickening of the renal afferent arterioles and hyaline capsular lesions of Kimmelstiel-Wilson's disease. An eighteen year old girl, after 15 years' duration of diabetes, died in coma; autopsy diagnoses were atheroma of the coronary arteries, fatty infiltration of the liver, abscess and fibrosis of the pancreas, and early Kimmelstiel-Wilson's disease.

DISCUSSION

A study of diabetes involving an assessment of diabetic control is difficult because of the many variable clinical and chemical factors occurring in the diabetic state. When physiological normality is the goal, the classification of the degree of control must depend on a knowledge of the factors previously mentioned. Full knowl-

edge of these is virtually impossible unless the patients are under constant institutional supervision and chemical studies are done frequently. Otherwise, the data must be incomplete as in this study. Since the basic information is not complete, nothing is to be gained by applying arithmetical formulæ or control indices to obtain a quantitative expression of what are essentially qualitative data. Under these circumstances, the simplest method of classification is the most satisfactory.

It is disheartening to note that 60% of the patients were placed in the "poor control" group. The reason for this large proportion may be that many of the patients had had little medical supervision and had learned little about their disease. Many had survived fifteen or more years of diabetes in spite of dire warnings and threats in some instances, and had become careless and unconcerned. The psychological aspect of treatment is being handled more effectively now with increased knowledge on the part of the physicians, patients and relatives. The unfortunate consequence of the lack of frequent careful examinations is that many complications develop asymptomatically and may be irreversible by the time the patient complains to his physician.

There is general agreement that as the duration of diabetes increases, the incidence of complications also increases. Of the various other factors that might influence the occurrence of degenerative complications, only control appears to have a significant effect. Though this series is small, one cannot escape the obvious trend—as the degree of control of the diabetes decreases, the frequency, severity and early onset of complications increases. These results strongly suggest that there is a definite value in attempting to attain physiological normality rather than being content with freedom from symptoms.[21] There is a difference between actual control and a mere freedom from symptoms; in uncontrolled but symptom-free patients there is an insidious progression of cardiovascular and renal disease. Though some authors feel that degenerative changes are inevitable, yet there is strong evidence at hand that these changes may be postponed; this is a goal worth striving for.

SUMMARY

A follow-up study is reported on a group of 81 diabetic patients, whose disease began in childhood or early adolescence and had been present for periods up to 28 years.

Only 40% of the group had been maintained in reasonably good diabetic control. The remaining 60% were considered as poorly controlled through most of their diabetic lives.

Of the 81 patients, 49 had demonstrable complications as follows; retinopathy in 41 cases; cardiac disease in 7 cases, renal disease in 11 cases, vascular calcification in 13 cases, neuropathy in 8 cases and skin lesions in 8 cases.

The incidence of complications increased with duration, and with the lack of good control of the diabetes.

The outcome of pregnancies occurring in a small group of women in this series supports the hypothesis that adequate diabetic control is of great importance in assuring the birth of living children.

The importance of constant striving for physiological control of the diabetes, as opposed to mere freedom from symptoms, in efforts to postpone the development of complications, is stressed.

The authors offer sincere thanks for the help given in this study by Drs. M. F. Clarkson, E. E. Jones, G. M. Low, M. J. O'Brien and R. W. Robertson. Dr. J. B. Firstbrook very kindly carried out the cholesterol determinations. The helpful suggestions and advice of Dr. A. L. Chute, Hospital for Sick Children, and of Professor R. F. Farquharson, Professor of Medicine, University of Toronto, are gratefully acknowledged.

REFERENCES

1. DOLGER, H.: *J. A. M. A.*, **134**: 1289, 1947.
2. JOSLIN, E. P.: *New England J. Med.*, **238**: 437, 1948.
3. CHUTE, A. L.: *Am. J. Dis Child.*, **75**: 1, 1948.
4. DRY, T. J. AND HINES, E. A.: *Ann. Int. Med.*, **14**: 1893, 1941.
5. ROOT, H. F.: *Am. J. M. Sc.*, **217**: 545, 1949.
6. WHITE, P. AND WASKOW, E.: *South. M. J.*, 41: 561, 1948.
7. WAGENER, H. P.: *Proc. Am. Diabetes A.*, **5**: 203, 1945.
8. O'BRIEN, C. S. AND ALLEN, J. H.: *J. A. M. A.*, **120**: 190, 1942.
9. BALLANTYNE, A. J.: *Arch. Ophth.*, **33**: 97, 1945.
10. ROOT, H. F. AND RODRIGUEZ, R.: *New England J. Med.*, **238**: 391, 1948.
11. DOLGER, H.: *Arch. Ophth.* **37**: 695, 1947.
12. GRIFFITH, J. Q. JR. AND LINDAUER, M. A.: *Am. Heart J.*, **28**: 758, 1944.
13. MASTER, A. M., FRIEDMAN, G. AND DACK, S.: *Am. Heart J.*, **24**: 777, 1942.
14. MILLARD, E. B. AND ROOT, H. F.: *Am. J. Digest. Dis.*, **15**: 41, 1948.
15. DOLGER, H.: *Mod. Med. Can.*, **4**: 50, 1949.
16. RUNDLES, H.: *Medicine*, **24**: 111, 1945.
17. JOSLIN, E. P. *et al.*: The Treatment of Diabetes Mellitus, Lea & Febiger, Philadelphia, 1946.
18. RABINOWITCH, I. M.: *Canad. M. A. J.*, **51**: 300, 1944.
19. ADLERSBERG, D., PARETS, A. AND BOAS, E. P.: *Proc. Am. Diabetes Assoc.*, **9**: 173, 1949.
20. MANN, G. V., GARDNER, C. AND ROOT, H. F.: *Am. J. Med.*, **7**: 3, 1949.
21. TOLSTOI, I.: *Am. J. Digest. Dis.*, **10**: 247, 1943.

The great man is the man who does a thing for the first time.—Alexander Smith.

Canad. M. A. J.
Feb. 1952, vol. 66

PRESENT STATUS OF DEFICIENCY STATES

CLIFFORD J. BARBORKA, M.D.,*
Chicago, Ill.

THE OCCURRENCE of deficiency diseases in the United States has not been noted generally, except in city hospitals, or in endemic regions. Although nationwide dietary inadequacies have been revealed by surveys, frank deficiency diseases on such a scale have not been seen. According to their concepts, clinicians rightly assert that they do not see deficiency diseases; but they are incorrect in concluding that there is no widespread prevalence of them. Every nutritional survey in the past decade has revealed that the consumption of diets below the recommended standards is widespread in the Unites States. All these surveys reveal a marked prevalence of dietary inadequacies as judged by recommended standards. The evidence is consistent. All reports show that very many persons are not receiving the recommended amounts of essentials. The evidence that such a large proportion of the population is eating unsatisfactory diets points to possible widespread prevalence of deficiency states. Indeed, inasmuch as diet surveys have limitations and other factors besides diet enter into the production of deficiency diseases, it is possible, if not probable, that deficiency states are more prevalent than indicated by results of dietary surveys. Even when the diet seems to contain sufficient amounts of essentials, its adequacy is often apparent rather than real.

Malnutrition is accompanied by manifold signs and symptoms, diverse in nature, and to the casual observer their origin and significance are not always apparent. Some types of malnutrition are strikingly obvious to everyone, some are apparent only to the physician who looks for them, and some are vague and elusive even to the careful observer using the most accurate, specialized techniques. If the first group alone is counted, the prevalence of malnutrition will be recorded as low, almost negligible. If the second group is counted, it will be recorded as high. If the third group is included, then the rate will be sufficiently high to occasion genuine concern.

The nutritional deficiency in the United States is seldom complete, nor is it often due to the lack of any one, single substance. More often, it is limited in extent and multiple in nature, and the resulting clinical picture is correspondingly hazy in outline. Deficiency disease occasionally appears in outspoken form of unquestionable, obvious states such as rickets, pellagra, scurvy or beriberi; but with vastly greater frequency the deficiency disease takes the form of vague, borderline states of ill health which destroy the patient's happiness and impair his usefulness and his efficiency.

The manifestations of subclinical deficiency states may be long delayed, depending on the degree of dietary inadequacy, the period of exposure to bad diet, or the secondary pathologic states that may interfere with absorption and utilization of a good diet. Thus, functional debility may be apparent long before nutritional disease appears. This may be mild or severe.

Let me define the nature of the development of a deficiency state. The respiration and the growth of cells involve the synthesis of complex substances from simpler chemical compounds. By means of substances called enzymes the cells are able to perform these functions without increased temperature or pressure. Enzymes are catalysts produced by living cells from combinations or organic substances, including the vitamins. These enzymes retain activity even when separated from the living cell. When a dietary deficiency of vitamins has existed over a long period of time, a biochemical lesion often severe enough to cause functional disturbances develops in the cell. If the deficiency is not corrected, these disturbances become more widespread and eventually give rise to an infinite variety of symptoms forming a complex clinical picture. Finally, severe or persistent alterations lead to a structural change or structural changes in the tissue, and ultimately the lesion of a deficiency disease is likely to appear.

The term, subclinical state of deficiency disease, has been employed by physicians to describe the early subcritical states of disease that could not be recognized readily by available methods of examination. The term, naturally, is in disfavour because it is too often used as a cloak for ignorance.

The early, mild, latent or subclinical forms of deficiency disease are manifold in nature. They produce effects which are insidious and elusive. Prominent among the symptoms of subclinical deficiency states one may find one or more of the following symptoms: poor appetite, lost

*Associate Professor of Medicine, Northwestern University Medical School.

Canad. M. A. J.
Feb. 1952, vol. 66

weight, lost strength, weakness, indigestion and dyspepsia (heartburn), diarrhœa, constipation and abdominal cramps, vague burning, itching, crawling sensations over the skin, nervous, irritable and depressed reactions with inability to sleep, apprehension, weeping spells, forgetfulness and mental confusion. A characteristic feature of nutritional deficiencies in humans in their multiple, symptomatic nature. Single deficiencies are uncommon in human beings; multiple deficiencies are the rule. This, of course, is in sharp contrast with the laboratory, where single deficiencies predominate by choice and are purposely produced singly when possible. This is desirable experimentally and has been very valuable, but it has undoubtedly been the explanation for delays, uncertainty and error in transferring laboratory animal findings to clinical medicine. We are learning that the incidence of deficiency states is much greater than had been thought. Such mild, or latent, or subclinical deficiencies are of greater importance than the more advanced cases. They are less obvious, more difficult to detect, affect greater numbers of people and are more apt to pass unnoticed and, therefore, untreated. Their effects are often indirect, influencing general health and efficiency rather than producing characteristic disease syndromes. The multiple nature of the deficiencies has favoured a more or less careless attitude toward diagnosis on the part of the physician. It is clear that the first problem in practice is to determine when a deficiency state exists or is likely to occur. This is not altogether an easy matter. While simple enough in the fully developed deficiencies, it is more difficult to diagnose the early, mild, latent or subclinical deficiency states. These states are, however, the types of cases which must be diagnosed if full advantage is to be taken of the newer developments in nutrition and progress is to be made in the diagnosis, the prevention and the treatment of these diseases. It is of no advantage to the patient, certainly, to wait until the deficiency diseases are perfectly obvious and fully developed before diagnosis is made and before treatment is recommended.

METHODS OF DIAGNOSTIC AID IN DETERMINING DEFICIENCY STATES

No longer should a patient be dismissed with the time-worn phrase, "There is nothing physically the matter with you," and the assumption that an imaginary or a nervous reaction is responsible. Too many times the diagnosis of chronic nervous or physical exhaustion has been substituted, due to the lack of diagnostic criteria, adequate to pigeonhole the case as a diagnostic entity. If nothing can be found physically or organically to account for the distress the patient manifests, not until all the light afforded by modern means of diagnosis of nutritional deficiencies is thrown upon the case in question should it be assumed that some malfunction of the physiologic mechanism is not responsible for the earliest manifestations of subclinical states of deficiency disease.

Deficiency disease is a question that should be given the attention of the intelligently progressive clinician. It is true that the human body can stand a lot of depletion. Vitamin deficiencies viewed experimentally may take from three to six months to manifest themselves even under laboratory, to say nothing of clinical, observation. Marginal states of nutrition, it is true may be maintained in man for fairly long periods until the advent of some secondary pathologic state or illness or some extreme stress or strain increases the demand over and above the limited intake and, therefore, brings the deficiency state to light.

We should not bury our heads in the sand and disregard the results of carefully planned studies that have demonstrated clearly the widespread incidence of nutritional deficiencies; nor, on the other hand, should we accept the snap judgment of those whose views are based on hit or miss observations as compatible with scientific progress.

Because vitamin deficiencies occur not only as a complication of other diseases, it is obvious that all who are engaged in practice must be conscious of their existence and alert to detect them. Any patient who is restricted by any cause in his intake of food or who, even with an adequate intake of food, suffers any interference with absorption or utilization should be examined critically for the possible presence of a deficiency disease. It is to be feared that the presence of multiple deficiencies in many cases and the absence of clear-cut signs or symptoms in the milder forms may foster carelessness and incomplete diagnosis and the complacent acceptance of such general terms as deficiency

disease, multiple avitaminosis and the like. Such assumptions are likely to lead to the uncritical or the indiscriminate use of complex vitamin mixtures in treatment. We suggest the following few methods to aid in determining these early, mild, latent, subclinical vitamin deficiencies.

DIAGNOSIS OF DIETARY DEFICIENCIES

In general, there are five methods of diagnosing dietary deficiencies: (1) to make a careful scrutiny of the diet (food eaten); (2) to watch for signs and symptoms of a deficiency as determined by history and physical examination; (3) to investigate factors which influence the digestion, the absorption and the utilization of the diet (conditioned malnutrition); (4) to make laboratory tests by the methods described for the presence of various vitamin deficiencies; and (5) to make a therapeutic trial with specific vitamin concentrates.

Making a careful scrutiny of the diet (food eaten). The necessity for detailed, often minute, inquiry as to the foods eaten should be emphasized. The importance of the quantitative and the qualitative factor in diet makes this necessary. It is especially helpful to have the patient record the kind and the amount of food eaten over a period of a week or more, if necessary. While error is possible with this method, it has proved a valuable aid in diagnosis. We are frequently astonished at the dietary deficiencies disclosed. By going over this data it can be quickly determined whether the patient's daily intake is meeting the essential requirements necessary to meet adequately the recommended daily allowances. A poor vitamin intake frequently exists for a long time before it can be recognized clinically. There are two basic factors responsible for errors in eating that make for an inadequate amount of vitamin in the diet. One is economic necessity, the other is ignorance of diet, for example, eccentricities in diet, such as excessive carbohydrates; fads in diets, such as improper weight reduction; chronic alcoholism which causes replacement of part of the diet; self-imposed diets, such as are associated with psychoneurotics; prolonged adherence to diet prescribed by physicians, especially in the treatment of peptic ulcer, chronic nephritis, chronic colitis, allergic states, cardiac diseases and biliary tract diseases.

Watching for signs and symptoms of a deficiency, as determined by history and physical examination. — Every experienced physician knows that the recognition, both subjective and objective, of early deficiency states as determined by history and physical examination is very difficult. The unscrambling of symptoms is a challenge. The signs and the symptoms suggestive of deficiency states, whether they are produced by a primary deficiency due to inadequate dietary intake or occur when the intake is adequate or are brought about by conditioning factors, are identical. It is necessary to point out, however, that with few exceptions the findings characteristic of deficiency states or malnutrition are nonspecific. Some lesions attributable to deficiencies may be produced by local tissue deficiency as a result of circulatory disturbances, trauma, pressure or infection. These local conditioning factors may produce lesions identical with those of a systemic deficiency. Other lesions may not be related to either systemic or local tissue deficiency, but may be due to some factor other than malnutrition or dietary inadequacy. These facts indicate that all the diagnostic skill and the clinical acumen employed by physicians in any other branch of clinical medicine must be employed in the interpretation of lesions usually ascribed to dietary deficiency states. The following example illustrates this point:

The mucous membrane lesions in and about the mouth present complex diagnostic problems: in some cases a magenta glossitis responds to riboflavin; in some others, to pyridoxine; and in still others, only to crude liver extract administered parenterally. Cheilosis may appear the same, whether due to a riboflavinosis, to edentulous mouth, to allergy or to lipstick. Scarlet fungiform papillæ at the tip of the tongue are the earliest visible signs of mild, acute nicotinic acid deficiency, but pipe smoking, particularly in persons unaccustomed to a pipe, may produce a similar picture. Vincent's gingivitis and stomatitis may occur in deficiencies of both ascorbic acid and nicotinic acid. This infection becomes active only in the presence of necrotic tissue. Ascorbic acid and nicotinic acid deficiencies are only two of the many causes of tissue necrosis in the mouth.

In other words, when the physician is presented with any of these signs or symptoms and is unable in his differential diagnostic efforts to find any particular pathology responsible, he is obligated to take into serious consideration the

possibilities of a dietary deficiency state being responsible.

Investigating factors which influence the digestion, the absorption and the utilization of the diet (conditioned malnutrition).—The terms malnutrition, nutritional deficiency disease, nutritional failure, pellagra, scurvy, beriberi, thiamine deficiency and similar terms signify to many persons disorders arising solely from an inadequate diet, but all these may occur in the presence of dietary adequacy. As pointed out by Kruse, these terms should denote a deficiency in the bodily tissues rather than in the diet. If a tissue deficiency arises from an inadequate dietary intake, it is known as a primary deficiency. If the tissue deficiency is caused by factors other than an inadequate diet alone, it is known as a conditioned deficiency. Conditioned deficiencies are caused by factors that interfere with the ingestion, the absorption or the utilization of essential nutrients, or that increase their requirements, destruction or excretion. The importance of these conditioning factors as a cause of deficiency disease, with or without the patient's taking an adequate diet, has not been generally recognized. The various illnesses and conditions that may produce such deficiencies are mentioned.

Making laboratory tests for detection of deficiency states. — It is often difficult to diagnose vitamin deficiency. In spite of careful scrutiny of the diet, it may be difficult to obtain a reliable dietary history from the patient. The symptoms and the physical signs suggestive of deficiency, particularly of deficiency of vitamins of the B complex, may be so numerous and varied as to be very difficult to interpret clinically. In some cases, though the dietary history has been entirely normal, and there is no apparent condition to prevent normal utilization of the food eaten, certain deficiency manifestations clear up as a result of therapeutic tests with vitamin supplements. Therefore, in the effort to diagnose vitamin deficiencies, laboratory tests to determine a patient's vitamin status have their place. In recent years, certain laboratory procedures have been developed which augment the diagnostic approach. Some of these laboratory procedures and practices have been in use many years and have been adequately studied and evaluated. Others have been developed only recently and may be subject to modification as progress is made in the field of deficiency diseases. Certain of the diagnostic tests mentioned require special laboratory facilities and are obviously not adaptable in their present form for use in the average routine laboratory. Yet it seems worth while to assemble those tests which at the present time are the most helpful in the diagnosis of deficiency states.

It is hoped that in the future methods will be devised so that borderline states will be better recognized and identified, both by a better understanding of physical signs and symptoms suggestive of early deficiency states and by new and more simplified laboratory tests which will show if an individual's bodily stock of vitamins is really low.

Making therapeutic tests with vitamin supplements. — Certain deficiency manifestations clear up as a result of therapeutic tests with vitamin supplements. This may also be of considerable diagnostic aid. A number of factors may influence the response; therefore, they are of importance diagnostically and therapeutically. When the therapeutic test is used, the preparation should be a specific concentrate and it should be as pure as possible. Treatment with several of the vitamins may be indicated; for example, a combination of A and D of the fat soluble vitamins or concentrates of the vitamin B complex components of the water soluble vitamins. The factor of dosage is of great importance, particularly in treatment or cure as contrasted with prevention. This is especially true when the avitaminosis complicates other diseases, when there is interference with absorption and utilization, when there is increased demand, or when there are conditions which lead to increased destruction of the vitamin intake. When absorption by usual routes is hindered, administration should be by routes which insure absorption. In other words, there will be occasions when the parenteral use of vitamins will be far preferable to oral administration, and even necessary. In certain instances, it will be necessary to add the vitamin concentrates directly to the solutions which are being administered intravenously.

In prophylaxis, in very mild deficiencies or in maintaining a cure, consideration of economy and palatability, also common sense indicates the use of natural foodstuffs. However, it is necessary to insure the availability of food, the proper preparation of it and the continuance of an adequate intake. In using vitamin concentrates, one must beware of over-dosage, not

so much because of harm or danger, which is almost nonexistent with the substances, but to protect the patient's pocketbook and to avoid waste generally, the possibility of which is greatly enhanced by the relative high cost of some concentrates and poor preparation.

CONCLUSIONS

Although the average physician realizes that modern scientific nutrition is a useful branch of medicine, he often knows too little of the details of the fundamental principles of nutrition to apply them. This manifests itself in the practice of prescribing a "reducing diet," a "gall-bladder diet," and an "ulcer diet," etc., leaving the details to the hospital dietician. The same physician would scarcely leave his pharmacotherapeutic problem to the druggist. Certainly, he would not order a course of digitalis for a patient with cardiac failure.

There are two reasons for this casual, or diffident attitude towards nutrition. The first is that the medical schools have been slow to incorporate the science of nutrition within the medical curriculum. The second is that the enormous literature on nutrition has been largely scattered in a diversity of technical journals not readily available to the general practitioner. A patient may be successfully treated for an organic disease like diabetes mellitus, colitis, peptic ulcer, or obesity and yet continue to exhibit some vague, nonspecific sign or symptom. The underlying reason frequently is an undiagnosed nutritional deficiency concomitant with, or conditioned by, the organic disease. It is often overlooked and during illness there may occur a catabolic loss of nitrogen or interference with the utilization or absorption of one or several nutrient factors, or perhaps an imbalance in the interrelationship between nutrients. This leads to conditioned nutritional deficiency. Unless it is corrected, the patient may remain chronically ill despite the fact that the underlying disease has been brought under control. Insofar as possible, every special diet should be patterned after a normal diet. Indeed, the therapeutic diet is merely a normal diet quantitatively and qualitatively modified to combat a specific physiopathologic process.

In prescribing a special diet, the physician must consider the patient's emotional and mental status. The patient should find the diet psychologically acceptable and be able to follow it at home. The physician should consider further, that anyone subjected for any length of time to a special diet is likely to undergo certain psychic trauma. Since he is not like other people, in this respect, he is not like them in others, and cannot compete with them. If the patient is a child, he is likely to become a problem child. Children should therefore be taken off a special diet as soon as possible. What is more, a special diet, particularly for a child, should always be arranged so as to be as inconspicuous as circumstances will permit. Overeating is another psychologic factor encountered in diet therapy. Overeating is the weapon with which patients often meet psychological traumatic experience, failure and disappointment. For such patients, keeping to a diet is hard. The physician whose patient fails to keep to a prescribed diet is sometimes inclined to become disgusted with him and assume a punitive attitude. This is both irrelevant and ineffective. It is the physician's part to discover what makes keeping the diet difficult. Knowing the patient's problems will help the physician encourage him to keep to his diet.

There are still many important gaps remaining in our basic knowledge although progress in nutrition has been great in many directions and almost unequalled by that of any other science.

People should be warned of the epidemic of dietary fads and faddists which is always a problem. The tremendous following of these faddists suggests that the public is vitally interested in nutrition and feels the need for concrete, simple, truthful, scientific and usable dietary information.

Today, when we have control and prevention of those diseases caused by improper sanitation such as typhoid fever, and where we have such wonder drugs as the antibiotics to combat the ordinary infectious diseases, nutrition stands as the single most important factor affecting our personal well being and that of our families, neighbours and friends.

RÉSUMÉ

Parce qu'il n'a pas été suffisamment préparé au cours de ses études médicales et qu'il ne peut lire tout ce qui s'écrit sur le sujet, le praticien connait habituellement peu la science moderne de la nutrition dans ses détails et dans la façon de les appliquer. Et cependant combien nombreux sont les malades qui, débarrassés d'une affection organique telle que colite, ulcère peptique, diabète ou obésité, continuent cependant de souffrir à cause d'un état morbide qui souvent n'est qu'une carence alimentaire surajoutée.

Autant que possible un régime alimentaire spécial doit être modelé sur un régime normal, mais en tenant compte

du statut émotionnel et mental du sujet. Une diète spéciale assez prolongée risque de provoquer certain traumatisme psychique, et chez les enfants surtout il importe de ne pas trop faire durer une diète ni la mettre trop en évidence.

Il y a cinq moyens de faire le diagnostic de carences alimentaires: (1) Faire un relevé minutieux du régime (aliments absorbés); (2) surveiller les signes de carences par interrogatoire et examen physique; (3) fouiller les facteurs qui influencent la digestion, l'absorption et l'utilisation de la nourriture; (4) faire des examens de laboratoire, et (5) faire un essai thérapeutiques des concentrés vitaminés.

Il importe de mettre les malades en garde contre les manies et modes en fait diètes. Que de si nombreux caprices aient cours il faut déduire que le public sent le besoin de renseignements simples, vrais et pratiques sur toutes les questions d'alimentation.

EVALUATION OF NEWER TECHNIQUES IN THE SURGICAL SCRUB

ELLIOTT HARRISON, M.D., F.A.C.S.* and
W. H. COCKCROFT, M.D., D.P.H.,†
Vancouver

THE QUESTION of the use of soaps or detergents containing Hexachlorophene in preoperative scrubs in the operating room came up for consideration at the Vancouver Unit of the British Columbia Division of Tuberculosis Control. As the cost of this new method varied somewhat from the cost of the previously used methods, it seemed important to know if there was any real value in the new products. The evaluation of these products was discussed with the bacteriological section of the laboratory of the Vancouver General hospital and with some of the surgical staff of that hospital. Since the operating room in the Tuberculosis Control is used routinely by only four thoracic surgeons, it was felt that a fairly well controlled group which would use a standard technique was available. The nurses in this operating room are all graduate nurses with postgraduate surgical training and thus capable of co-operating in the experiment. The details of the bacteriological methods of obtaining cultures were laid down by the General Hospital laboratory and partly carried out by the laboratory of the Division of Tuberculosis Control. All the cultures were inspected and supervised by the General Hospital laboratory. Particular interest of the Chest Department in this type of hand preparation is due to the rather long operating periods that are necessary and the rather frequent puncturing of gloves during operation.

Hexachlorophene‡ incorporated in liquid soaps and synthetic detergents has appeared on the market in the past few years and various claims have been made that such compounds, if used as a daily scrub or wash can reduce the bacterial flora of the skin to very low levels.[1]

The purpose of this paper is to report the findings when two of these products were compared under operating room conditions and also to report a comparison of four products under conditions differing from those used in the operating room.

Hexachlorophene or G 11 is a phenol derivative described by Gump in 1941. It differs from most phenols in that it retains at least part of its activity in the presence of alkaline soaps. Numerous workers[2, 3] have presented evidence to show that after repeated use for scrubbing, a very low bacterial population remains on the hands and forearms. Accepting this evidence, many hospitals have begun to use hexachlorophene compounds routinely and the tendency is for the surgical scrub to become increasingly short. However, it should be remembered that a single scrub with such a preparation does not lower the bacterial population of the skin appreciably more than does a routine ten minute surgical scrub with a non-medicated soap followed by an alcohol dip.[4]

METHODS AND MATERIALS

Our studies consisted of two separate investigations; "A" that carried out in a combined effort between the operating room and the laboratory; and "B", a study using laboratory personnel as subjects. In study A three methods of hand preparation have been compared: (1) Surgical scrubs with pHisoHex.* (2) Scrubs with Germa Medica† with G 11. (3) Scrubs with a bland liquid soap followed by an alcohol dip. The scrubs were carried out as follows:

pHisoHex.—After use for an initial period of at least ten days, the test scrubs were begun. Water was applied to the hands and arms followed by the use of approximately 2 c.c. of pHisoHex. After one minute of ordinary washing, the nails were cleaned and the hands washed thoroughly with water. Then 4 c.c. of pHisoHex were applied to a brush and the hands and arms were scrubbed with this one application for five minutes add-

*Senior Surgeon, British Columbia Division of Tuberculosis Control.
†Department of Pathology, Vancouver General Hospital.
‡Hexachlorophene (G 11 -Sindar Corp. N.Y.) bis. (2 hydroxy-3, 5, 6,-trichlorophenyl) methane.

*pHisoHex—Winthrop Stearns Inc.—an acidic synthetic detergent containing hexachlorophene 3%.
†Germa Medica with G 11—Huntington Labs. Inc.—Containing hexachlorophene 2½% (anhydrous soap basis).

ing water only from time to time. It should be noted that approximately 6 c.c. of pHisoHex were used for each scrub.

Germa Medica with G 11.—The procedure used was similar to that with pHisoHex except that at least twice the volume of Germa Medica was used. The stock solution of Germa Medica was used in dispensers at a dilution of 1 in 3.

Bland soap with alcohol rinse.—A routine ten minute scrub followed by a rinse with 70% alcohol.

STUDY A

For the first period, covering about three weeks, the participating nurses scrubbed daily with Germa Medica, while the surgeons used pHisoHex. Bacterial counts of the flora of the hands were made, the technique to be described later. Then the products were interchanged, the nurses using pHisoHex and the surgeons Germa Medica, and after a period of ten days a second series of counts was begun. When the second series was complete, both groups began to use a bland liquid soap followed by an alcohol rinse, and again after a further ten day period a third series of counts was begun. It would have been preferable to have done this series first, but pHisoHex was already in use when it was decided to carry out these investigations.

Plate counts of rinse water. — Each subject, after the scrub, rinsed under the tap, then rinsed his hands in a sterile basin containing 1,000 c.c. of sterile water, after which he dried his hands with a sterile towel and put on gloves and gown in the usual manner. After one hour of operating, the gloves were removed and the hands were rinsed in a second basin of sterile water. Fresh gloves were put on and at the completion of the operation the hands were again rinsed in a third basin of water. No other antiseptic was used on the hands at any time apart from the period during which the non-medicated soap was being used. Aliquot samples, using 1 c.c. of rinse water were used to make poured plates using tryptose agar with 2% blood. Each specimen was done in duplicate and the plates were incubated at 37° C. for forty-eight hours before doing counts. Table I shows the results of these counts.

TABLE I.

BACTERIAL COUNTS OF HANDS DURING OPERATIONS

Time	*Product used*	*Bacterial count per litre* > 5,000	> 25,000	> 100,000	*Total number of scrubs*
Before operation	N.M.[1]	79%[4]	37%	16%	19
	G.M.[2]	10%	0	0	32
	P.H.[3]	10%	0	0	29
After 1 hour	N.M.	87%	66%	13%	15
	G.M.	44%	13%	4%	23
	P.H.	0	0	0	26
End of operation (1½-5 hrs. duration)	N.M.	89%	74%	48%	19
	G.M.	48%	39%	3%	31
	P.H.	7%	3%	0	29

1. N.M.—Non-medicated liquid soap—ten minute scrub followed by alcohol dip.
2. G.M.—Germa Medica with G 11 2½% (anhydrous soap basis) diluted 1 in 3.
3. P.H.—pHisoHex—3% G 11.
4. 79% of the 19 scrubs had counts of more than 5,000 organisms per litre of rinse water.

STUDY B

This study was confined to the laboratory and using a slightly different technique five compounds were compared. (a) An alkaline liquid soap containing 2½% G 11, anhydrous soap basis (Germa Medica) diluted in water 1 in 3. (b) An alkaline liquid soap containing 5% G 11, anhydrous soap basis—"R4X" diluted in water 1 in 2. (G. H. Wood & Co., Ltd.) (c) Gamophen bar soap 2% G 11, anhydrous soap. (Ethicon Suture Labs., Inc.) (d) pHisoHex. (e) Bland liquid soap.

The subjects washed under the tap using two applications of the test soap over a three minute period, rinsed under the tap, then rinsed in one litre of water and counts were done using the technique described above. The subjects then went about their usual work in the laboratory, washing their hands and arms twice daily with the test soap, and on the third day, after six washes, counts were again done on rinse water using the same technique. A rest period of at least ten days, during which time no G 11 product was used, was taken between tests. Table II shows the results of this work.

TABLE II.

Product used	*Bacterial count per litre* > 5,000	> 25,000	> 100,000	> 500,000	*Total number of scrubs*
N.M.	100%[1]	100%	100%	62%	8
	100%[2]	100%	87%	50%	8
G.M.	100%	100%	87%	25%	8
	100%	75%	37%	0%	8
Gam.	100%	100%	87%	50%	8
	100%	75%	13%	0%	8
R4X	100%	100%	100%	50%	8
	100%	65%	37%	0	8
Ph.	100%	100%	81%	31%	16
	13%	0	0	0	16

(1) Upper line with each test product represents counts after the first wash with that product.

(2) Lower line—counts after six washes over a three day period.

N.M.—non-medicated liquid soap.

G.M.—Germa Medica 2½% G 11, diluted 1 in 3.

Gam.—Gamophen bar soap 2% G 11.

R4X—R4X liquid soap with 5% G 11 diluted 1 in 2.

pH.—pHisoHex (3% G 11).

RESULTS

Admittedly the number of participants in these two experiments is not large. However, the results of Study A suggest that there is a significant drop in the flora recoverable from the hands after G 11 preparations are used. When a non-medicated soap with an alcohol rinse was used, most of the subjects appeared to have reduced the flora to a considerable extent. After operating for an hour, the counts began to rise and at the end of the operating time, which was usually between one and one-half and five hours, almost half the subjects had counts of over 100,000 organisms per litre of rinse water.

When the test soap Germa Medica with G 11 was used, the post-scrub counts were very low and the counts rose to moderate numbers as the length of time that the gloves were worn increased.

When the pHisoHex product was used all counts taken remained at very low levels. Throughout these tests the nurses generally had slightly lower counts than the surgeons, but for the sake of brevity the figures have not been broken down in compiling the table.

From Study B on the laboratory personnel it was found that after one wash with any of these soaps, we were able to culture practically as many organisms from the hands as when a bland soap was used. But after six washes over a three day period the alkaline soaps appeared to have definitely reduced the flora, while the acid pHisoHex preparation had so altered the flora that remarkably few organisms were recoverable in the rinse water. Although the concentration of G 11 varied in the three alkaline soaps, the figures do not enable us to say that one of these soaps was superior to another.

DISCUSSION

The variables that are present in any technique that attempts to determine the bacterial flora on the skin are many and the results of such experiments may easily be misinterpreted. From the work presented we can go no further than to say that some factor, presumably the hexachlorophene, was responsible for altering the skin flora to a point where few viable organisms could be cultured from the rinse water, and that the pHisoHex preparation appeared to keep the flora at a lower level for a longer period than did an alkaline soap–G 11 preparation.

The fact that a simple three minute wash with pHisoHex twice daily for three days can reduce the flora so greatly suggests that the action is a chemical one rather than a physical one. It was questioned whether the oily base of the pHisoHex might act as a physical barrier which would account for some of the low counts after its use, but as we were able to culture many organisms from the skin after one wash with this preparation, this explanation seems unlikely.

Our data give no reliable figures of the remaining viable organisms on the skin, yet the numbers that we were able to culture back after gloves were removed may indicate the relative chances of contaminating a wound when gloves are accidentally punctured. As hexachlorophene is a relatively slow acting antiseptic it seems probable that its usefulness for the preoperative preparation of the site of operation will be of limited value. No instance of skin sensitivity attributable to hexachlorophene was noted and the general impression was that the alkaline soap preparations used here caused about the same degree of skin irritation as previous liquid soaps have done. No skin irritation was encountered when the pHisoHex product was being used.

SUMMARY

1. The bacterial flora of the skin was considerably reduced by the regular use of hexachlorophene incorporated with either an alkaline soap or a synthetic detergent.

2. The reduction was maintained better when the synthetic detergent, pHisoHex was used.

3. A single wash with any of these substances did not lower the skin flora appreciably below the levels reached when a non-medicated soap was used in place of the hexachlorophene preparation.

4. The particular value of these substances from the data obtained in this experiment, would appear to be in the hand preparation for prolonged surgery since the bacterial flora of the skin can be suppressed for a long period of time.

REFERENCES

1. TRAUB, E. F., NEWHALL, C. A. AND FULLER, J. R.: *Arch. Dermat. & Syph.*, **52**: 385, 1945.
2. SEASTONE, C. V.: *Surg., Gynec. & Obst.*, **84**: 355, 1947.
3. BEST, R. R. AND COE, J. D. *et al.*: *Arch. Surg.*, **61**: 869, 1950.
4. BLANK, I. H. AND COOLIDGE, M. H.: *J. Invest. Dermat.*, **15**: 257, 1950.

The heaviest head of corn hangs its head lowest.—*Gael. Prov.*

Canad. M. A. J.
Feb. 1952, vol. 66

THE DIAGNOSIS AND SURGICAL MANAGEMENT OF GALL STONE ILEUS*

ROBERT M. LEVINE, M.D.C.M., F.R.C.S.[C.]† and
CHARLES B. RIPSTEIN, M.D.C.M., F.R.C.S.[C.], F.A.C.S.,‡ *Brooklyn, N.Y.*

OBSTRUCTION OF THE BOWEL by a gall stone is a rather uncommon entity but it has not received the prominence it deserves. It is rarely diagnosed preoperatively and the resultant tendency to temporize in treatment has contributed to the high morbidity and mortality reported in these cases.

Incidence.—Bartholin recorded the first case in 1654 and Courvoisier in 1890 gathered and analyzed 131 reported cases. Von Wagner, quoted by Cameron[1] collected a total of 334 cases recorded in the available literature up to 1914. Foss and Summers[10] reported a further series of 150, including 10 cases of their own. Walters and Snell[2] state that 2% of all bowel obstructions are caused by gall stones and Hand and Gilmore[3] report the same obstructing agent in 208 (1.7%) out of 12,153 cases of intestinal obstruction. These only partially represent the number that have actually been studied as most general surgical services encounter one or two cases of this type per year. This condition occurs in the older age group and is rarely seen in patients under 50 years of age, although Wortman[4] reports a case in a 25 year old female.

Biliary tract disease is encountered four times more frequently in females[5] than in males and as would be expected, gall stone ileus occurs more commonly in females.

Pathogenesis.—There are two pathways by which gall stones may enter the intestinal tract. First through the cystic and common duct, and second via an internal biliary fistula between gall bladder and bowel. The necrotizing action of a large stone, aided by increased intraluminal tension is responsible for erosion through the gall bladder wall with abscess formation, adhesions, fistula formation and penetration of the stone into the bowel.

The usual sequence of events is acute gangrenous cholecystitis with cholelithiasis; perforation, and subsequent fistula formation into the duodenum. The stone may remain in the duodenum, it may pass into the stomach and be vomited, or it may pass down the intestinal tract to produce mechanical blockage. Occasionally fistula formation occurs between the gall bladder and the transverse colon, and the stone is passed per rectum. There are no reported cases of stones sufficiently large to cause large bowel obstruction.

The size of the stone is of critical importance. Hennessy[6] states that stones less than 2-3 cm. in diameter will pass spontaneously. However, even small stones may become a nidus for fæcal accretions with subsequent enlargement in size. Intestinal spasm and mechanical obstruction play a part in the pathogenesis of this condition; spasm may convert a subacute blockage into an acute one.

Mechanical obstruction may occur due to volvulus about the obstructed point. Perforation is fairly common and may be due to erosion of the gut wall at the site of impaction, or to distension of the dilated proximal bowel. The calibre of the small bowel decreases progressively caudad, thus in most instances obstruction takes place in the region of the ileo-cæcal junction or terminal ileum.

It is remarkable that so few of the reported cases give any history of cholecystitis, a necessary precursor of this disease. Three of the four cases in our series presented both a history and x-ray evidence of previous gall bladder disease thus affording clear clinical examples of the pathogenetic process.

Diagnosis.—An accurate diagnosis is seldom made preoperatively, mainly because this condition is rarely considered as a possible cause of intestinal obstruction. The signs and symptoms are those of small bowel obstruction, but there may be a history of antecedent gall bladder disease. In some instances, an episode of upper abdominal pain precedes the intestinal obstruction.

X-ray examination of the abdomen may reveal one or more of the following findings which are diagnostic of gall-stone obstruction. (1) Evidence of acute or sub-acute small intestinal obstruction in all cases. (2) An opaque gall stone within the bowel lumen. (3) Air or contrast media in the biliary passages indicative of a cholecyst-enteric fistula. (4) A stone previously observed in the gall bladder displaced into the intestinal tract. Rigler, Bowman and Noble[7] were able, in retrospect, to make a positive diagnosis in 13 out of 14 cases of obstruction by x-ray examination alone. A survey of the literature in 1943 by Nitkin and Lesser[8] revealed visualization of the biliary radicles in preoperative x-ray films, when correlated in retrospect with the operative findings. Mallory[9] points out that gall

*From the Department of Surgery, Maimonides Hospital and the State University of New York College of Medicine at New York.
†Formerly Chief Resident Surgeon, Maimonides Hospital.
‡Director of Surgical Services, Maimonides Hospital.

Canad. M. A. J.
Feb. 1952, vol. 66

stones large enough to produce intestinal obstruction consist chiefly of cholesterol and contain little calcium. Thus one would not expect a high percentage of them to show roentgenographically.

In 3 of our 4 cases we were able to make a preoperative diagnosis roentgenographically. In one instance the same large gall stone seen originally on cholecystogram was visualized as the cause of a small bowel obstruction six months later (Fig. 1). In the second, a scout film of the abdomen revealed evidence of acute intestinal obstruction and the presence of air in the bile passages.

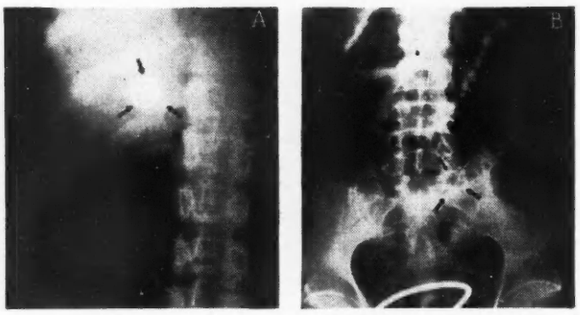


Fig. 1. (Case 1).—Note the gall bladder calculus identified by x-ray examination 6 months previously (A), now appearing as the cause of small bowel obstruction (B).

Surgical management. – Preoperative intubation with Miller-Abbott, Cantor or Harris tube is mandatory in this condition. It facilitates the operation by some degree of decompression of the distended small bowel proximal to the obstruction. It is also important to restore fluid and electrolyte balance before surgery, and since many of these patients are diabetics, this condition must be investigated and treated. At operation the point of obstruction may be identified in the usual manner by tracing collapsed small bowel orad from the ileo-cæcal junction. Once located the treatment of choice is enterostomy in the longitudinal axis of the bowel at the site of the obstructing concrement, preferably after the stone has been milked proximally 2-3 feet, to a healthier region of the bowel (Fig. 2). The gall stone, in the rare instance, may be milked distally through the ileo-cæcal junction and into the colon obviating the necessity for opening the bowel, or it may on occasion be gently crushed and dissipated between the fingers.

Following removal of the stone the bowel is closed in 2 layers in its transverse axis. Excessive spillage should be controlled by walling off

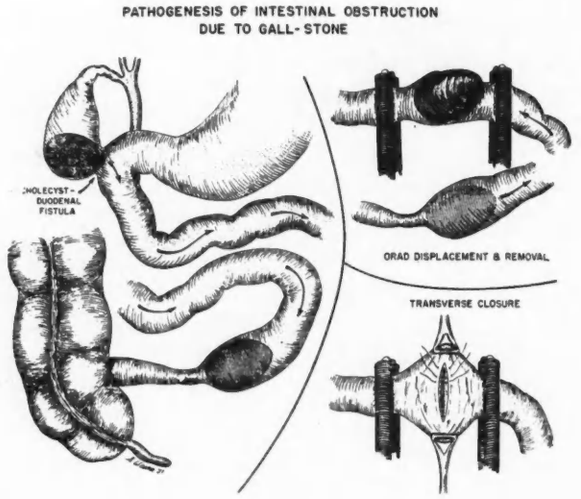


Fig. 2

the affected loop and by applying rubber covered clamps proximal and distal to the enterostomy site.

No attempt should be made to identify or repair the cholecyst-enteric fistula. Cholecystectomy with closure of the fistula may be carried out at a later date if biliary tract disease symptoms become evident. At the conclusion of the procedure the previously passed intestinal tube should be advanced manually well into the jejunum.

Postoperatively, gastro-intestinal suction should be maintained until adequate decompression is obtained and flatus is passed by the patient. Electrolyte imbalance should be anticipated and antibiotic treatment vigorously maintained in view of the gross contamination resulting from the opening of the obstructed bowel.

CASE 1

S.C., a 64 year old male, a known diabetic of 16 years' duration was admitted to the medical service of Maimonides Hospital presenting a history of subcostal heaviness, epigastric discomfort and RUQ pain of five days' duration, accompanied by intermittent vomiting.

The patient had undergone a left mid-thigh amputation in 1943 for arteriosclerotic gangrene, and in May 1949, six months prior to this admission, had been in hospital with a diagnosis of diabetic acidosis accompanied by nausea and severe vomiting, at which time x-ray examination had revealed cholelithiasis. Because of his known diabetic history and the similarity of his symptoms to those induced by his acidotic state on recent admission, 48 hours were spent evaluating this patient metabolically.

Laboratory examination.—Hgb. 15.5 gm.; W.B.C. 11,200; R.B.C. 5.12 mill.; Urinalysis: Gluc. 2 plus; Acet. 0; CO_2 29.2 meq.; Cl. 96.7 meq.

X-ray examination.—Scout film of the abdomen revealed jejunal distension with laddering, and an ovoid free shadow 2.5 cm. in diameter overlying the upper margin of the left sacro-iliac joint. Reference to film

of the gall bladder taken 6 months' previously (May 1949) revealed this to be the gall stone then demonstrated in the gall bladder (Fig. 1).

A diagnosis of gall stone ileus was made and a Cantor tube passed. At operation an impacted gall stone measured 3.5 cm. in diameter was identified a short distance from the ileo-cæcal valve. An incision was made directly over the stone and following its removal this was closed in 2 layers. No exploration of the gall bladder region was carried out.

The patient received both penicillin and streptomycin. He ran a very stormy postoperative course complicated by an extensive wound sepsis culminating in dehisence on the 9th p.o. day. The wound was packed and strapped together. This was accompanied by the development of indolent spreading septic ulcers on the abdomen and scrotum. Wound and ulcer healing became evident only after one month of energetic supportive treatment including frequent transfusions, high protein diet and the use of a wide variety of antibiotics and local applications, including bacitracin, furacin and zinc-peroxide pastes.

He was discharged on the 58th postoperative day and was subsequently admitted two months later for repair of his incisional hernia. He has remained well since that time.

CASE 2

A 70 year old female was admitted to the surgical service of Maimonides Hospital complaining of upper abdominal pain with nausea and vomiting of three days' duration. Daily enemas were effective. Previously she had been hospitalized for acute cholecystitis with cholelithiasis which was treated conservatively. She was advised to return to hospital in four months for cholecystectomy but because of subsidence of symptoms operation was refused.

Physical examination revealed a dehydrated female with a generally distended abdomen exhibiting RUQ tenderness and the suggestion of a mass.

Laboratory examination.—Urinalysis negative: Alb. –; Bile –; Hgb. 104%; R.B.C. 5.3 mill.; W.B.C. 19,500; Polys. 78; Stabs. 8; Lymph. 11; Monos. 3.

X-ray examination.—Scout film of the abdomen revealed "continuous distension of jejunum the upper ileum with a small gas collection in the subhepatic region believed to be within the gall bladder with an adjacent medial collection, which may well be within the common duct". A careful survey of the abdomen did not reveal a gall stone. A repeat film showed the biliary radicles outlined by gas (Fig. 2).

Small intestinal obstruction with cholecyst-intestinal fistula was thus demonstrated and a diagnosis of gall stone ileus substantiated. A Cantor tube was passed.

At operation, a gall stone 3.2 cm. in diameter freely mobile in the distal ileum was identified, milked proximally and removed via a longitudinal incision in the bowel which was closed transversely in 2 layers. The wound was closed in layers about a penrose drain. The patient received both penicillin and streptomycin. She ran an uneventful course and was discharged on the 9th day.

CASE 3

R.B., a 62 year old Italian female was admitted with a 3 day history of persistent vomiting, constipation and severe LUQ abdominal cramps. Patient had had a hysterectomy performed 30 years previously. No history of previous abdominal symptoms. Physical examination revealed a dehydrated patient with distended and tympanitic, but soft and non-tender abdomen. Active peristalsis was present. T. 101.

X-ray examination.—X-rays of abdomen showed "moderate continuous distension of jejunum to about its junction with ileum. Ileum and colon are empty and collapsed. A ring-shadow is noted in the right costovertebral angle. There is a vague radiolucent branching shadow in the RUQ which is suggestive of air within the biliary tract. Diagnosis: small intestinal obstruction; cholelithiasis; gall stone ileus?"

A Cantor tube was passed and the patient's dehydration treated with I.V. fluids. At operation an oval shaped gall stone approximately 7 x 4 cm. was impacted 8 inches from the ileo-cæcal valve. Ileum proximal to this point was distended. The stone was removed through a longitudinal incision which was then closed transversely with 1 layer of continuous atraumatic catgut and 1 layer of interrupted silk. Dense adhesions in the region of the gall bladder were left undisturbed. The patient ran an uneventful postoperative course and was discharged on the 10th day.

CASE 4

K.G., a 53 year old married female was admitted to the surgical service of Maimonides Hospital with a history of progressive obstipation, generalized crampy abdominal pains and nausea and vomiting of 7 days' duration. There was no relevant history of previous disease. 4 days prior to admission extreme abdominal distension had been partially relieved by enemata. Physical examination revealed a soft diffusely distended abdomen exhibiting slight tenderness below and to the right of the umbilicus.

Laboratory examination.—Hgb. 3.5 gm.; W.B.C. 15,950; Polys. 74%; Stabs. 6%; Monos. 25%. Urinalysis negative.

X-ray examination.—Scout film of the abdomen revealed the presence of an ileus probably dynamic, in view of the abrupt and peculiar pattern assumed by the lowest coils of gas distended jejunum. A Cantor tube was passed and the patient prepared for laparotomy.

At operation a gall stone measuring 6 x 3 x 4 cm. was found, impacted in the proximal ileum 50 cm. from the ileo-cæcal valve. The stone was milked orad approximately 8 cm. and removed through a longitudinal incision which was closed transversely in 2 layers. Dense pericholecystic adhesions were noted. Further exploration was deemed unwarranted and the abdomen was closed without drainage. The patient ran a benign postoperative course. A subcutaneous wound infection developed. This rapidly responded to treatment and the patient was discharged on the 12th postoperative day.

DISCUSSION

It is apparent that this condition must be considered in all patients over the age of 50, suffering from intestinal obstruction, particularly of the subacute variety. The absence of a history of previous biliary tract disease is misleading and x-ray evidence though at times diagnostic must not be totally relied on.

Operation is mandatory once the diagnosis is suspected, and should be carried out early, awaiting only intestinal decompression and adequate hydration of the patient. Wound infections in two of our cases demonstrate the danger of contamination by the contents of the obstructed bowel and the necessity for vigorous antibiotic therapy.

SUMMARY

1. The literature concerning gall stone ileus has been reviewed and the diagnostic criteria discussed.

2. Four cases, 3 diagnosed preoperatively by x-ray examination have been presented.

3. The importance of early diagnosis and early surgical intervention has been stressed.

BIBLIOGRAPHY

1. CAMERON, D. F.: *J. Indiana M. A.*, **30**: 231, 1937.
2. WALTERS, W. AND SNELL, A.: Diseases of the Gall Bladder and Bile Ducts, W. B. Saunders Co., Phila., 1940.
3. HAND, F. H. AND GILMORE, W. E.: *Am. J. Surg.*, **59**: 72, 1943.
4. WANGENSTEEN, O. H.: Intestinal Obstruction, C. C. Thomas, Springfield, Ill., 1942.
5. ADAMS, R. AND STRANHAN, A.: *Surg., Gynec. & Obst.*, **85**: 776, 1947.
6. HENNESSY, M.: *J. Iowa M. Soc.*, **24**: 581, 1934.
7. RIGLER, L. G., BORMAN, C. N. AND NOBLE, J. F.: *J. A. M. A.*, **117**: 1753, 1941.
8. NITKIN, R. L. AND LESSER, A.: *Ann. Surg.*, **118**: 101, 1943.
9. Case Report No. 33202: *New England J. Med.*, **236**: 763, 1947.
10. FOSS, H. C. AND SUMMERS, A. D.: *Ann. Surg.*, **115**: 721, 1942.

1440 Crescent Street.

ADVANCES IN COLON AND RECTAL SURGERY

ALLEN O. WHIPPLE, M.D., *New York, N.Y.*

TEN YEARS AGO many surgeons dreaded and shunned this surgery because of the morbidity and mortality due to leakage and peritonitis. During the intervening years, certain improvements in pre- and post-operative care, in technique, in new discoveries in antibiotics and more radical procedures in the treatment of neoplasms of this part of the gastrointestinal tract have definitely changed our views regarding the surgery of the colon and rectum. An example of this change is well illustrated in the fact that formerly the exteriorization operation of Mickulicz was considered the operation of choice for carcinoma of the colon because it carried with it a low mortality. However, it usually required two or more operative procedures, frequently resulted in fistulæ, and of course did not remove the lymphatic drainage area that at present is accomplished by the radical resections. Today the Mickulicz procedure is seldom if ever used in our best clinics. Furthermore, radical resection and total colectomy is being used increasingly at present for such lesions as diffuse polyposis and ulcerative colitis, with encouraging results.

In this discussion, I should like to take up the various factors that have made the present day surgery of the colon and rectum safer, more radical and more successful.

PREOPERATIVE STUDY AND CARE

The more careful study of the patient has emphasized the importance of certain information to avoid mistakes and complications. Every patient with rectal bleeding should have digital and proctoscopic and sigmoidoscopic examination. Forty per cent of rectal cancers have been previously diagnosed as bleeding hæmorrhoids before coming to the Memorial. It is now well recognized that the colon can present more than one lesion. For this reason, a thorough x-ray study of the colon by barium and air contrast enemas should be made in patients with carcinoma of the rectum and sigmoid, to detect other carcinomatous areas and polyps. Early diagnosis and complete diagnosis is of course essential in curing these lesions.

Many of these elderly patients are anæmic, undernourished, and show imbalance of their proteins, fluids and electrolytes. Thorough study of the blood cytology and blood chemistry will often reveal the unsuspected need of transfusion and restoration of electrolyte balance, especially in two elements—sodium and potassium. This is especially true in cases of ulcerative colitis.

Anæmia is a definite finding in many of the colon and rectal cancers, as well as in the ulcerative colitis patients. This is most marked in some of the cæcal and ascending colon carcinomas, although not in all of them. Proteinæmia is associated in many of the anæmic patients and transfusion with carefully matched blood is an essential preoperative measure. Proteinæmia is helped by a proper high protein high carbohydrate diet better than by intravenous proteins.

Proper emptying and antibiotic preparation of the colon is a most important preoperative measure and cannot be overemphasized. This varies with the site of the tumour and with the presence or absence of obstruction. If obstruction is present at the rectosigmoid junction—a common site in high rectal cancer—or in the descending colon, the splenic flexure or distal transverse colon, a transverse colostomy proximal to the obstruction is a better first stage procedure than a cæcostomy. If the obstruction is in the hepatic flexure or ascending colon, a cæcostomy is indicated. However, if the cæcum is markedly distended and thin-walled, great care must be used in dealing with it, for until the gas is first evacuated by syringe aspiration to allow the walls to collapse, the cæcum may suddenly tear

and flood the peritoneum with quantities of fluid fæcal material. If the obstruction is in the cæcum or at the ileocæcal valve, or if there is a terminal ileitis requiring an ileocolostomy, preoperative intestinal intubation is of the greatest importance in emptying the dilated loops of ileum, before a right colectomy and ileocolostomy are done. This measure will insure a proper intestinal anastomosis, for unless tension on the suture line is removed leakage with peritonitis or a fistula will compromise the success of the resection and anastomosis.

Preoperative catharsis and the administration of one of the newer antibiotics is now considered mandatory. To empty the colon, castor oil ℥ ii for two successive days in non-obstructed cases followed by 1 or 2 soapsud enemas is adequate; chloromycetin or terramycetin for 3 to 5 days before operation will largely eliminate the colon flora and these antibiotics, as well as penicillin and bacitracin, have unquestionably reduced the danger of peritoneal complications and increased the advantages of open anastomoses.

THE OPERATIVE PROCEDURES

The choice of anæsthesia for colon and rectal surgery should depend upon the co-operation between surgeon and anæsthetist in studying the individual patient. The anæsthetic should fit the patient and not the patient the anæsthetic—a mistake too often made. Continuous spinal procaine in the hands of an experienced anæsthetist gives ideal relaxation. But it should not be used for a debilitated, elderly patient or for a high strung patient whose apprehension has to be controlled with too much preoperative sedation. Much of the operation can be conducted under light inhalation or intravenous anæsthesia with careful administration of one of the curare derivations for relaxation during the wound closure.

The operative procedures of course vary with the site of the lesion, and the presence of lymph node involvement. Here it may be stated that in patients with a single liver metastasis, resection of the cancer is thoroughly justified, even though the operation is a palliative one. The freedom from later obstruction, bleeding and pain will make the patients far more comfortable for the remaining months of life than if the resection is not done because of liver involvement.

In patients with a cæcal, ascending colon or hepatic flexure cancer, a right colectomy with ileocolostomy is indicated. For this operation I have found that an oblique incision from the flank above the umbilicus through the right rectus to the midline below the umbilicus gives the best exposure and the best postoperative repair and scar. For the past ten years, I have used silk throughout and have been able to make a much finer anastomosis than when I used catgut. In repairing the wound, I have used interrupted silk for peritoneum and aponeuroses and have not closed the subcutaneous fat or skin, merely placing a V-shaped strip of fine silk or rayon in the subcutaneous fat and skin. By the seventh to tenth day, the silk strip comes away easily without bleeding, leaving an ideal granulating wound the edges of which can be easily approximated with adhesive strips. The scars are linear and I have had no ventral hernias with this method.

I have preferred an open anastomosis between transverse colon and terminal ileum, either by end to end, if the two lumina are relatively of the same size, or an end to side if the colon is larger. If the field of anastomosis is well walled off, the peritoneum readily takes care of the marginal contamination. We do not give the peritoneum enough credit in our abdominal surgery. It is our greatest ally. The success of an intestinal anastomosis depends upon four factors: (1) maintenance of an adequate blood supply to the two limbs of the stoma; (2) freedom from tension on the suture line; (3) accurate and adequate apposition of the peritoneal margins of the stoma by the use of a sero-muscular suture. This may be either interrupted mattress or by a continuous interrupted suture. The mucosa plays no part in the repair. The so-called aseptic anastomosis does not deal with the mucosa and is dependent upon the sero-muscular sutures. (4) The use of fine needles and fine suture material. For this reason, and fine silk technique with its connotation of gentle handling of tissues, and fine instruments are ideal.

Attempts to close the two edges of the denuded peritoneum of the posterior abdominal wall, after removal of the cæcum and ascending colon are usually difficult. It is unnecessary, for adhesions do not form between the bowel and the parietal peritoneum. On the other hand, the edge of the mesentery of the ileum should be united to the mesial border of the posterior peritoneum to avoid an internal hernia. This same technique can be used for patients having a

terminal ileitis. In these patients, as well as the ulcerative colitis cases, the psychogenic or anxiety factors must be carefully studied and eliminated if recurrence is to be avoided.

For cancers of the transverse colon, a wide resection of the greater portion of this part of the colon with special attention to removal of the lymph-bearing mesocolon and mid-colic vessels is essential. By freeing the peritoneum in the two lumbar gutters, the hepatic and splenic ends of the colon can be freed and approximated for an end to end anastomosis. The position of an easily injured duodenum must be constantly kept in mind in this procedure.

In cancers of the splenic flexure and upper descending colon, it is often advisable to remove the spleen and tail of the pancreas in order to remove the lymph-bearing area of this part of the colon. This is especially true if the fixation of the splenic flexure is thought to be due to invasion by the tumour.

For early tumours of the lower left colon and sigmoid flexure, an oblique incision similar to the one used for the right colon should be used with a wide resection of the growth and the mesentery, and an end to end anastomosis. The repair of the wound is carried out as on the right side.

There are two chief indications for total colectomy—intractable and prolonged ulcerative colitis with irreversible mucosal and connective tissue changes in the colon, and multiple polyposis, especially in patients with a familial history of carcinoma of the colon. The chief problem in the past with total colectomy has been the necessity of an ileostomy, a condition that is at best very difficult to live with and which is intolerable to individuals of a sensitive and fastidious temperament. It has been the cause of suicide in many patients.

During the past five years, a real advance has been made, largely as the result of the work of Mark Ravitsch of the Johns Hopkins Hospital. He has demonstrated the possibility of bringing the proximal end of the resected ileum down to the lower end of the resected rectum, for either an end to end anastomosis or a "pull through" of the ileum through the terminal portion of the rectum. This permits sphincter control of the ileal contents, which of course are loose movements and require several daily evacuations. But this is incomparably preferable to the use of an ileostomy bag, with the unavoidable leakage and tender raw skin about the ileostomy. The complication in the pull through operation which too often occurs is a fæcal fistula at or near the rectum.

The operations for carcinoma of the rectum and lower sigmoid colon have been the source of argument and controversy. The earlier perineal and sacral resections, with perineal colostomies, are no longer condoned. They were formerly done by proctologic surgeons who did not have the experience or the ability of the abdominal surgeon. Miles of London deserves the credit for revolutionizing the concept and the technique of the combined abdominoperineal resection of the rectum with removal of its intra-abdominal lymph node spread. He was an amazingly clever and dexterous surgeon. His only equal in regard to technical skill that I ever saw in this operation was the late Tom Jones. These two and, be it said, their long term assistants, knew every step and made the operation look too easy. It is a difficult procedure and especially so in an obese patient, particularly a fat male.

In this country, among the leading advocates for the combined abdominoperineal resection, with a permanent colostomy, have been Daniel Jones, T. B. Jones, Fred Rankin, Harvey Stone, Vernon David, Robert Binkley and Michael Deddish. They have consistently contended that a less radical resection compromises the curability by operation. I am in entire agreement with them, based upon my own experience. The misapprehension and dread of a permanent colostomy has periodically impelled surgeons to attempt the preservation of the rectal sphincter in the operation for cancer of the rectum. There is at present a resurgence of this attempt, which appeals to the less well-trained surgeon, inexperienced in the pathology and natural history of cancer. Owen Wangensteen gave this procedure of preserving the sphincter a thorough trial but has now abandoned it for the even more radical abdominoperineal, and is advocating "look in" later exploratory operations to find residual or recurrent cancer in patients who have had the radical procedure.

During the past three years, Deddish of the Memorial Hospital, in New York City, has been carrying out an even more radical abdominoperineal resection by ligating the inferior mesenteric vessels at their origin and removing the lymphatic vessels and lymph nodes *en bloc* from the duodenum along the aorta into the pelvis, the obturator foramen, and along the

lateral surfaces of the levators. This requires a removal of the major part of the descending colon. In a series of 25 patients with this type of abdomino-pelvic node dissection, Deddish found 24%, almost a fourth of them, had node involvement other than intermesenteric and pararectal node metastases. Organs adherent to a cancer of the terminal pelvic colon and rectum should be resected and the same radical *en bloc* abdominopelvic node dissection carried out. This is the type of surgery that is now being done by Meigs and Brunschwig for primary and recurrent carcinoma of the cervix and uterus.

For the abdominoperineal resections, a left pararectus incision from above the umbilicus to the symphysis gives the best approach and exposure for the radical surgery. This is the type of pelvic surgery that is being attempted by gynæcologists and urologists who have not had training in general surgery and in bowel surgery. The results will be bad and will reflect on the work that in the competent hands of general surgeons is rehabilitating patients hitherto considered hopeless and inoperable.

The closure of these wounds is of great importance, for wound disruption in the patients with this radical surgery is a most serious complication. The use of steel wire, both in layer repair and in through and through interrupted sutures is being used more and more, and undoubtedly reduces the incidence of wound dehiscence. Furthermore, undoubtedly steel or silver wire causes less tissue reaction than any other suture material and, with the use of antibiotics, seldom results in suture sinuses.

The repair of the perineal wound in abdominoperineal resections is a difficult problem. If the perianal excision is limited, especially in low cancers of the rectum, recurrence may develop. In these cases the healing of the perineal wound by granulation, because of the rigid pelvic walls, is slow, and is the chief cause of prolonged convalescence. These wounds cannot be closed and should be tamponed inside of a silk or rayon envelope. The use of a rubber envelope for the gauze packing does not permit drainage inside the rubber dam, and, if left in for more than a day or two, results in maceration of the tissues in contact with it. If the perineal wound is sutured, poor pelvic drainage and puddling in the hollow of the sacrum is very apt to occur.

The question of drainage in operations on the colon and rectum is an important one. At present, the use of antibiotics pre- and postoperatively has largely eliminated the need for draining because of wound and peritoneal contamination. However, the placing of one or two small cigarette drains near, but not against, the suture line of the anastomosis for two to four days is advisable as a line of exit in case of leakage from the anastomotic area. This is only a precautionary measure, for if the essential factors in bowel anastomosis are met, leakage will not occur and the peritoneum is entirely competent to deal with marginal contamination. In the hands of the experienced and competent surgeon, the dictum of "when in doubt, do not drain" may well be right. The old dictum of "when in doubt, drain" too often meant drainage in all wound repair, for the inexperienced and poorly trained surgeon was always in doubt.

POSTOPERATIVE CARE

The immediate postoperative complications to be avoided are imbalances of protein, fluids and electrolytes, as well as bladder and renal dysfunction. The late complications are largely dysfunction of the bladder and urinary infection.

In the first week, it is essential to have careful restoration of blood volume by transfusion. The desire to maintain an adequate urinary output tempts the surgeon to force intravenous glucose and saline solutions. Unless there has been a careful check on the serum sodium and potassium levels, this forcing of water and saline will dilute the potassium and bring on what is now recognized as a potassium deficiency syndrome and metabolic alkalosis. The symptoms of this are asthenia, anorexia, rapid irregular pulse with marked changes in the T waves of the electrocardiogram, and abdominal distension due to œdema of the intestinal tract. If unchecked, the syndrome shows disorientation and muscular twitching going on to coma and respiratory paralysis. This syndrome can be prevented by the use of potassium chloride gm. i t.i.d. and if it appears it can be quickly remedied by the use of the same drug.

An indwelling catheter to relieve the initial atony of the bladder and to get an accurate measure of urinary output is essential for the first week. The use of modern antibiotics controls the urinary infection which formerly was almost always present and was the cause of severe later complications.

Proper preoperative emptying of the colon and the use of antibiotics should prevent distension with the closed colostomy during the

Canad. M. A. J.
Feb. 1952, vol. 66

first 48 hours. After this period, the colostomy can be opened safely and, especially if it is a left lower quadrant, can be prevented from contaminating the midline incision. If the peritoneum is sutured to the colostomy segment and the subcutaneous fat and skin is loosely packed around the colostomy segment, retraction of the colostomy is avoided. A protrusion of the segment for a distance of 5 to 7 cm. will make it much easier to care for the colostomy and prevent later constriction of the colostomy by its inversion by a constricting skin scar.

THE TRAINING OF THE PATIENT IN THE CARE OF THE COLOSTOMY

This is of the greatest importance if the dread of a colostomy is to be avoided. This brings up the question as to whether a patient should be told about the colostomy before operation. Surgeons differ as to this policy. It is my own conviction that the patient should be told that a colostomy is necessary or may be necessary before he recovers from the operation to find that he is afflicted with what he does not understand and has not been warned of beforehand.

But after the operation, the patient should be reassured and instructed in the care of the colostomy during his hospital stay. Patients differ markedly in their need of colostomy irrigations. Too often they are left with the idea that they must spend hours irrigating the bowel until they get a clear return—advice given too frequently by the surgeon or the nurse instructing him in the care of the colostomy. This time spent frequently prevents the patient from resuming his occupation and is liable to turn him into a hypochondriac with his time and attention devoted to his colon.

The use of a colostomy bag—an ileostomy bag is of course unavoidable—I would condemn as unnecessary and complicating.

Many years ago, I heard Dr. W. W. Keen, the surgical philosopher of his day, tell of his discarding the colostomy bag for his patients. He told of a tall, bearded man coming to his office. The man said he was a former patient, whose rectum Dr. Keen had removed some twelve years previously. Dr. Keen said he was glad to see him but was sorry that there had been this long interval. The man said he could not help it because he had been working in the Amazon jungles and had only recently returned. "Well, how does your colostomy work?" asked Dr. Keen. "Perfectly," said the patient, "of course, my colostomy bag wore out after a few months in the jungle, so I had to devise some other method. I made a cruller out of moss and covered this with a banana leaf and held this in place with a canvas belt and trained my colon to move once in the early morning. I have no trouble with it now because I use non-absorbent cotton and oiled silk over it and make my canvas belts."

Since then, I have taught my patients this method and have not advised a colostomy bag with uniform success.

The colon can be trained to do what you want it to do. If you do not train it you will do what it wants to do. The vast majority of individuals without organic obstruction can be cured of chronic constipation within a week or ten days, if they can be convinced that cathartics and enemas are the cause of their trouble.

THE REHABILITATION OF THE COLOSTOMY PATIENT

This important program has been woefully neglected by most of the surgical services in our hospitals. The Rehabilitation Committee of the Memorial Hospital in New York City has been concentrating its study on patients that have had a colostomy for five or more years, to learn their problems of readjustment and rehabilitation. This committee is composed of a physician, three surgeons, a psychiatrist (not an analyst), a social service worker, and the head of the nurses' training school. Our interest in establishing this committee, of which Dr. Bradley Coley is chairman, was the result of Dr. Coley's work in demonstrating the value of rehabilitation in the amputees of the hospital. This group, now calling themselves the Amputees' Alliance, has been of the greatest help to its members as well as to the surgeons in dealing with patients requiring amputations.

In the study of our five year colostomy patients, we have found astonishing examples of hypochondriasis among those who had not been properly instructed. Many of the patients had a guilt complex and felt that the colostomy was a penalty imposed upon them for an imagined or real moral delinquency in earlier life. A number of these individuals had become recluses, shunning social contacts and living on unemployment funds. I well remember one of my own patients who for eighteen years lived as a hermit on an island in the Long Island Sound, supporting himself by gathering and selling oysters. Fortunately, he was not a typhoid carrier.

On the other hand, it is astonishing how well adjusted some of these people have become, leading useful and self-supporting lives without any handicap because they had been trained and had learned the proper care of the colostomy. They had trained the colon and were not the victims of colon dictation. This phase of rectal and colon cancer should be given far greater attention than has been true in the past.

Canad. M. A. J.
Feb. 1952, vol. 66

POST TRAUMATIC OR INFECTIOUS LOCALIZED SEROUS MENINGITIS OR SUBDURAL HYGROMA

JEAN SIROIS, M.D., *Quebec City*

THIS PATHOLOGICAL ENTITY has been known and described for many years. But in reviewing the literature and the textbooks in neurology we are impressed on finding so little in the English and American books or journals while the French literature gives greater emphasis to it.

Our modern world with its mechanisation and all its industries and factories has made head injuries more frequent and thus we face many patients with undoubted physical sequelæ from their injuries. And I am under the impression that the subdural hygroma is more frequently responsible for those sequelæ than is realized. Many names are given to this entity: hypertensive meningeal hydrops—post-traumatic serous meningitis – subdural hydroma and subdural hygroma. The latter seems now more frequently used and I think corresponds more to the facts observed by the surgeons.

During the last ten years, we have had the opportunity of observing 57 cases of hygroma of traumatic origin, all confirmed by surgery. Study of these cases has revealed that there exist different categories of symptoms that can be divided into three fairly distinct groups. Each case, according to symptomatology can be classed in one of these groups. This classification is a helpful adjunct to therapy and better prognosis.

First group.—This group includes those patients presenting with purely subjective complaints. Trauma has been mild and loss of consciousness of only a few minutes' duration, followed by headache, dizziness and nausea. In a few days or weeks, these disturbances progressively disappear or at least are sufficiently attenuated to justify resumption of work. There is then subsequently a progressive recurrence of the same symptoms, but with absence of vomiting, of visual disturbances or motor and sensory phenomena in the limbs. Headache is more marked on lying down, therefore worse in the morning but improving slightly during the day. The patient is easily fatigued and has no desire for work; he becomes anxious and passes from physician to physician in quest of relief. This state becomes tiring and depressing and generally compels the patient to quit his usual employment. If unfortunately, the patient be on compensation and the latter is deemed inadequate and because of his physical disability and resultant psychological state, he becomes irritable and troublesome he is passed off as a malingerer. Finally he is considered neurotic.

Thus in summary: slight trauma followed by disappearance of initial headache and dizziness; then subsequent recurrence of the same clinical features with, in addition, a slight modification of temperament and behaviour due to persistence of these disturbances and often because of failure to obtain relief from lack of understanding. In general, physical, neurological and radiographic examinations are negative. Lumbar puncture provides temporary relief. Encephalography is essentially normal except on occasion for a slight cortical haziness on one side. The cerebrospinal fluid is generally within normal limits both manometrically and chemically.

CASE 1

E.L., contractor aged 43. On April 21, 1945, injury to the left foot causes a fall and occipital injury. No loss of consciousness; temporary dizziness; immediate hospitalization for treatment of the foot injury. The slight occipital headache and dizziness were completely gone in a matter of three weeks; resumption of work. Then appear intermittent bouts of headaches and dizziness appeared, but were completely gone in a matter of three weeks; resumption of work. Further intermittent bouts of headaches and dizziness appeared initiated by abrupt movements of the head. Until February 2, 1950, the patient vainly sought relief of his disturbances which were progressively worsening and causing deterioration of his general health, leading to cessation of work at the end of October 1949. Then appeared intermittent numbness of the extremities, blurring of vision and tinnitus. The patient became irritable and developed an aversion to work. Admitted to hospital on February 2, 1950, the right knee jerk reflex was more active than the left and there was a positive Hoffman sign on the right. Roentgen examination of the skull revealed a slight increased intracranial tension and on encephalography, an accumulation of oxygen was found in the left occipital region. On February 17, exploratory trephine, in the left occipital region, revealed a large subdural accumulation of fluid.

The patient was discharged on February 23, substantially improved. He was seen six months later; had resumed his occupation, had no further symptoms and considered himself cured.

CASE 2

M.B., a young man of 23, in mid-September 1947, was struck by the branch of a tree on the left frontal region. There was no loss of consciousness. He was absent from work till the middle of October when his headaches and dizziness disappeared. He was compelled to re-abandon work on November 8, because of recurrence of the same symptoms. No other disturbances were mentioned. Neurological examination was essentially negative. Lumbar puncture revealed no abnormalities. On encephalography, there was evidence of obliteration of the left fronto-parietal subarachnoid space. Left frontal trephine, performed on November 24, liberated about 75 c.c. of a clear fluid, following which cerebral pulsations became visible. On December 5, the patient was discharged from

Canad. M. A. J.
Feb. 1952, vol. 66

hospital completely cured and able to resume his occupation in early 1948. When seen six months later, he was in excellent health.

CASE 3

R.L., on August 20, 1947, the patient was subjected to trauma entailing momentary loss of consciousness. Persistence of headache and dizziness prevented resumption of work. On December 1, 1947, he was admitted to hospital and underwent neurological and radiographic examination which revealed no abnormalities. Encephalography was performed and revealed an accumulation of oxygen over the right frontal region. The C.S.F. was normal.

Marked improvement permited his discharge on December 20. He returned to work on March 11, 1948, was compelled to re-abandon his occupation because of recurrence of headaches, frequent nausea, dizziness, exhaustion and depression. He was readmitted and a trephine opening made over the right frontal region. A large hygroma was evacuated containing from 100 to 125 c.c. of a straw coloured fluid. Convalescence was rapid, and at the beginning of April, 1948, he was able to resume regular employment in a paper factory. I see him occasionally from time to time and he is perfectly well.

CASE 4

A.L., aged 23, a labourer, received an insignificant injury without loss of consciousness and therefore continued to work. On the fourth day following his injury he began to suffer from headaches, a sensation of weight on the top of the head and marked tiredness. These disturbances progressed rapidly and compelled him to leave work on the 8th day *i.e.*, August 11. He was admitted to hospital on the 13th. On examination, there was a definite haze on both fundi and a slightly positive right Babinski.

Encephalography confirmed the presence of a hygroma in the left superior parietal region which was evacuated by a trephine opening on August 16. He was discharged from the hospital completely cured at the beginning of September.

In this first group, we were dealing with rather insignificant injuries. Without the assistance of encephalography and trephine openings accurate diagnosis could not have been made and treatment would have been considerably delayed.

Second group.—The second group comprises those cases in which (a) the usual post-traumatic symptoms persist for weeks and months; (b) followed by physical signs of slight increase of intracranial tension; and (c) in particular definitely localized signs of compression-like motor or sensory disturbances. These physical signs are of moderate intensity. There is no true hemiplegia or hemianæsthesia. In general, the injury is severe enough to cause a prolonged loss of consciousness. After their accident, these patients are unable to return to work because of the intensity of their headache and dizziness. The intracerebral hypertension which results causes frequent bouts of nausea occasionally accompanied by vomiting, a blurring of vision, but only very rarely papillœdema or optic atrophy. Intermittent diplopia is occasionally noted but with no obvious strabismus. The patient then complains more and more of a localized pain at the site of injury, a unilateral sensation of weight or numbness if the compression occurs in a posterior frontal or parietal lobe; intermittent visual disturbances in the nature of dark or luminous spots before the eyes, if the temporal or occipital lobe is involved, and finally, if the injury affects the frontal region and the accumulated fluid has compressed the frontal lobe, the patient becomes depressed, anxious and ill-tempered, worried and may even become disorientated and slightly confused.

In summary: this group includes those patients suffering from trauma of moderate intensity and who experience persistence of their symptoms and appearance of the signs of slight intracranial hypertension with motor and sensory disturbances quite definitely localized. Physical examination confirms the presence of a localized area of slight compression. All of these signs in general appear only a few weeks or even months following the accident. Lumbar puncture provides the patient with little relief. Encephalography has more diagnostic but less therapeutic value.

The following three cases illustrate the above observations.

CASE 1

P.L., a young man of 18, was involved in a bicycle accident on April 13, 1950. He was unconscious for eight hours. On the following day, his doctor observed a left hemiparesis. X-ray of skull was negative. On April 16, I saw him in consultation. The patient complained of generalized headaches. He had vomited frequently since the accident, and was very dizzy on moving his head. He complained of a marked feeling of weight in his left extremities. On examination, a left hemiparesis was evident with important pyramidal signs on that side. The left abdominal reflexes were abolished; the fundi were normal and there was no evidence of facial paresis. A diagnosis of right fronto-parietal hæmatoma or hygroma was made. A trephine opening performed on the same day confirmed the presence of a large hygroma. He was discharged from hospital on April 24, quite cured. He was seen three weeks later with no evidence of any sequelæ.

CASE 2

A 27 year old truck driver, was involved in an auto accident on August 28, 1947. There was no loss of consciousness but in a few hours, he began experiencing violent headache, dizziness and nausea that demanded rest in bed. On the following day, he experienced numbness of his right extremities and the day after an 80% paresis of the upper extremity and a 50% paresis of the lower extremity. He was compelled to stay in bed. On x-ray of the skull, a right occipital linear fracture was obvious. During the following days, there was a certain remission of the motor disturbances, particularly of the lower extremity, sufficient to permit him to walk around, but with a marked limp. The headaches were slightly

less and the bouts of nausea disappeared. However, there was a persistent dizziness attending movements of the head. He was admitted to hospital on September 20, and observation was made of a right hemiparesis more marked in the upper extremity; there was a marked diminution of cortical sensibility of the right extremities; the right abdominal reflexes were decidedly diminished and positive right Hoffmann and Babinski were present. The fundi were slightly hazy. Encephalography confirmed the presence of a large clear area in the left temporo-parietal region and a trephine opening at this point confirmed the presence of a large hygroma. The C.S.F. was normal.

He was discharged from hospital on December 12, quite improved but it was some four months before the physical signs mentioned above had completely disappeared. Since then, he has resumed his occupation.

CASE 3

G.G., a docker, aged 38, sustained a fall of 60 ft. into the hull of a boat, on November 16, 1949. He was picked up unconscious and brought to hospital where he remained unconscious and confused for a period of three weeks. On regaining consciousness there was evidence of a left hemiparesis and numbness of his left extremities. A number of lumbar punctures were made and the patient was submitted to physio- and mechano-therapy. Slight spasticity developed in the right upper extremity. C.S.F. revealed 0.90 of protein. Finally, he was brought to see me on December 4, 1950, a year after his accident. Faced with evidence of a localized compression we performed an encephalogram there being no suggestion of generalized intracranial hypertension. This examination confirmed the presence of a right parieto-occipital hygroma which was evaluated by trephine; 150 c.c. of subdural fluid was removed. The numbness, the motor disturbances of the lower extremity, the headaches, the persistent dizziness, all disappeared in a period of 2 weeks, but a certain spasticity of the upper extremity particularly of the hand, persisted and was still present without much alteration when he was last seen in March 1951.

Third group.—Finally in the third group, we have the severe traumatic cases. Trauma is extensive, the loss of consciousness is complete and prolonged, of a duration varying from several hours to several days. The patient has been comatose or remains so. Wisely, rest has been absolute to the point of even abstaining from more precise diagnostic examination and particularly surgical intervention. Neurological examination performed several hours after injury, provides evidence of localized compression nearly always, in the nature of a marked hemiparesis and even hemiplegia. Rarely are the pupils uneven. Light reflexes are good and the pyramidal signs are quite marked. One immediately thinks of a hæmatoma or compression by a depressed fragment, but radiological examination of the skull and digital palpation eliminate this latter possibility. Presumptive diagnosis of hæmatoma is thus entertained but the final diagnosis is established only at exploration. Rarely is the expected hæmatoma found, but we are frequently faced with a large collection of fluid.

If the patient has regained consciousness after several days, without surgical intervention, the signs of compression will persist to disappointment of kin and attending physician. The possibility of hæmatoma is then again entertained.

It will be noticeable that there exists no free interval between the time of injury and the loss of consciousness and appearance of physical signs. The latter appear quite rapidly when the patient is in his initial coma. There lies an important diagnostic point between a sub- or extradural hæmatoma and post-traumatic localized serous meningitis. Thus, briefly: serious trauma, unconsciousness, immediate and persistent coma, obvious physical signs obtained at the 1st neurological examination performed some hours following injury, but with equal pupils, no strabismus, no loss of reflexes to light and particularly no free interval between the moment of injury and the onset of coma.

Of this group, the four following cases are outstanding and seem to be most characteristic.

CASE 1

This is only a summary of this case which was published in detail, in the *Union Médicale du Canada* in 1942. A child of 8 sustained a serious injury on May 20, 1942. He was unconscious for 24 hours. On awakening, the attending physician noted a right hemiplegia and motor aphasia. Believing the findings to be due to contusion, an expectant attitude was adopted. As the disturbances persisted, I was called in on consultation on May 28. Neurological examination revealed normal fundi, a slight central right facial paresis, motor aphasia, right flaccid hemiplegia with loss of reflexes but right positive Hoffmann and Babinski signs.

There was no evidence of cranial fracture on x-ray examination, but there were mild signs of intracranial hypertension. The possibility of a hæmatoma was entertained. A left temporal trephine was performed. On opening the dura mater, there was an escape of approximately 50 c.c. of straw-coloured fluid. Following this escape, the normal cerebral pulsations were evident. The cortex appeared quite normal and there was no evidence of hypertension. The opening in the dura mater was not closed so that continuous drainage was assured. The aspirated fluid contained 1 gram per 1,000 of protein. On the second postoperative day, the child was able to speak and move his right extremities. On the 10th day, he was walking and even running around his room. Thus, a complete and rapid regression of the compression signs which had been present for 8 days following the accident.

CASE 2

Y.G., a child of 12, on October 22, 1948, sustained a fall on his head. He immediately became unconscious and remained so for 36 hours. On admission to hospital, x-ray of the skull was negative. On awakening, a right hemiplegia, motor and sensory aphasia were observed. As the signs persisted, he was brought to us on October 31. He arrived in a wheel chair, unable to talk but able to execute the requests put to him. He was suffering from a right hemiplegia with exaggeration of reflexes on that side. There was clonus of the right foot, positive Babinski and Hoffmann signs on the right side, and absence of right cremasteric and abdominal reflexes. The remainder of the neurological examination was essentially negative. Temperature 99; pulse 64; blood pressure 80/30. Left temporal trephine opening was performed and a large quantity of subdural fluid was removed. The dura mater was left opened for future drainage. Move-

ment of the right extremities reappeared in 24 hours, and the child was able to walk on the 4th day. However, return of speech was delayed till the 10th postoperative day. He was discharged from hospital on November 20, *i.e.*, 14 days after exploration, able to talk without difficulty and thus completely cured. When seen 2 months later, he was perfectly well, had returned to school and was able to participate in sporting activities.

CASE 3

A. de la C., a child of 4 years, was seen in consultation approximately 6 hours after sustaining severe cranial injury on October 2, 1948. He was comatose, limp and suffering from a large wound of the scalp, in the left temporo-parietal region. There was also evidence of linear fracture. The wound had been sutured by his doctor. Expectant treatment was instituted and coma persisted for 5 days, during which, repeated bronchial aspirations were indicated and performed. On the 5th day, his doctor discovered a flaccid right hemiplegia. I saw the child again on October 14. He was conscious, with normal temperature, pulse of 84 and blood pressure of 90/58.

There was no evidence of intra-cranial hypertension but a flaccid right hemiplegia and motor aphasia were present. We advised lumbar puncture and the aspirated fluid was bloody with a protein content of 0.90 gm.. The puncture was followed by no improvement of hemiplegia or aphasia. Finally, on October 26, he was transferred to our service and on the 27th, a left temporal trephine opening was performed. The tension was such that on opening the dura mater, xanthochromic liquid spurted out to a distance of 8 or 10 inches. It was present in great quantity and it took about 8 minutes before cerebral pulsation became apparent. The dura mater was left open for drainage. Movements of the right limbs were regained in 36 hours. Speech returned on the 8th day. He was able to leave on November 7th. Complete function of the right extremities was not regained for about 3 months and when he was seen at that time, there was no residual aphasia.

I am under the impression that these motor verbal disturbances persisted for such a long period following evacuation of the hygroma because of the delay of 25 days which existed before exploration was performed. This should have been performed on the 6th or 7th day, when there was evidence of localized compression. The experience of the two preceding cases seems to justify this suggestion.

Before proceeding to physio-pathological considerations, I would like to report a case in which a hygroma, apparently post-infectious, was producing the same symptoms and was cured by a trephine opening.

Line G., a child of 4, was hit by a truck on October 18, 1950. She was unconscious for an hour at the most. There was evidence of a serous sanguinous discharge from the right ear. Convalescence progressed satisfactorily for 6 days, and the child was not voicing any complaint till November 5 when she suddenly developed severe headache, vomiting, cervical rigidity and in a few hours, chills and elevation of temperature. A diagnosis of meningitis was made and confirmed by the lumbar puncture. Antibiotic therapy was instituted controlling the infection in a few days. But the child remained somnolent, complaining of severe headaches apparently localized to the right side. The mother noticed that the child's vision was deteriorating. She began to vomit frequently, became dehydrated and on November 18, her doctor noticed a left hemiplegia. I was then called in consultation and observed apart from the above findings, bilateral optic atrophy, more marked on the right and left pyramidal signs. There was also evidence of meningismus, a temperature of 100, pulse 120. Blood count was essentially normal except for a leucocytosis of 11,000. The possibility of a right temporal abscess was envisaged. An emergency trephine was immediately carried out and a 250 to 300 c.c. collection of yellow fluid was found, subdurally and under tension. The arachnoid, and cortex at this site, appeared normal. The temporal lobe was explored with a brain needle and no pus returned. A small drain was left. In less than 48 hours, the child was moving the left limbs quite freely. Vomiting had disappeared and she was able to take nourishment by mouth. On December 2, she left the hospital, cured. She was seen again in March, 1951, had put on weight and was completely normal.

PHYSIOPATHOLOGY

We have intentionally limited this study to localized serous meningitis of traumatic origin except for the last case where it appears that the acute meningitis was the important complicating factor. There are two varieties of serous meningitides: (1) Generalized serous meningitis, so well described by Quincke, in which is observed a hypersecretion or generalized exudation of fluid, which spreads to all the intracranial cavities, to the subarachnoid and even to the subdural spaces. We are then faced with a syndrome of intracranial tension of variable intensity with sudden exacerbation entailing severe headaches and obnubilation and a few signs of meningeal irritation. The etiology of this acute primary serous meningitis is still obscure and the consideration of an inflammatory process is purely hypothetical. (2) Localized serous meningitis may be of an infectious or traumatic origin. Ear, mastoid, frontal, ethmoid or sphenoidal sinus infections, naso-pharyngeal infections, suggest a localization to the ponto-cerebellar angle, to the cerebellum, to the basilar region or to the region of the chiasm.

It seems logical to assume that a focus of chronic infection has extended and produced, in the arachnoid, a secondary reaction and the formation of adhesions which have interfered with cerebro-spinal fluid circulation and given rise to an encysted local accumulation.

In order to accept the theory of exudation due to localized hyperæmia, it is necessary to overlook the adhesions which must exist in order to understand the localized accumulation of fluid. The most acceptable theory then seems to be that of an extension of an inflammatory process with formation of adhesions and consequent impairment of circulation. Localized post-traumatic serous meningitis occurs mainly on the cerebral convexity and presents one of the three syndromes already discussed. The traumatic injury

causes a laceration of the arachnoid at the site of injury and, according to the extent of this laceration, an abrupt or gradual escape of cerebro-spinal fluid into the subdural space. The varying amount of fluid will determine the degree of compression and therefore the type of syndrome. It must be noted that the subdural accumulation of fluid may be slow as evidenced by the case reported by McDonnel, in which a burr hole performed 7 hours after injury, revealed no abnormality, but re-exploration 9 days later uncovered a large quantity of accumulated fluid. Wycis mentioned a similar case. Adson also refers to localized laceration of the arachnoid which he has observed during an exploration for hygroma.

DIAGNOSIS

Apart from the positive signs of localization, when these are present, we have at our disposal for diagnosis such auxiliary procedures as lumbar puncture, encephalography and trephine opening.

In those cases pertaining to the first group, lumbar puncture is generally of no assistance. Tension is normal and there are no biochemical abnormalities. Puncture may, at most, provide relief for a short period of time. In the second group, puncture is more likely to provide relief, and protein values are raised. In the third group of cases, lumbar puncture is contraindicated. It is of no diagnostic or therapeutic value and may adversely affect the condition of the patient by producing a cone of compression due to concomitant presence of cerebral œdema, generally present. Thus in general, lumbar puncture is of little value in cases of hygroma.

In the first group, encephalography, although rarely of value as a diagnostic agent, presents, on the other hand, a very valuable therapeutic adjunct. In fact, after negative encephalography, one often witnesses great improvement in these patients, undoubtedly due to the fact that minute adhesions have been broken and normal circulation of spinal fluid restored. On the other hand, in the second group, encephalography will often yield positive results insomuch as it reveals large clear subarachnoid spaces at the site of the hygroma, or an absence of the normal clearness of the subarachnoid spaces. There is little therapeutic effect in this instance. Finally, in the third group, in the face of localized compression, trephine opening is indicated rather than encephalography.

Trephine opening is useful, from the point of view of diagnosis, only in this third group of patients because only this procedure will establish the diagnosis between hygroma and a sub- or extra-dural hæmatoma.

TREATMENT

As already mentioned, the treatment of hygroma is limited to encephalography or trephine opening. Encephalography should be instituted in the first group of patients. We wait then a period of one or two months before having recourse to trephine opening only if the symptoms persist.

Trephine should be performed immediately for patients of the third group as well as for those in the second group with positive encephalographic findings. If in the latter group encephalography is negative, it is then preferable to advise expectant treatment as in the first group, and this may be rewarded by spontaneous cure in spite of the mild physical signs of local compression. The hygroma not being extensive may regress.

The site of trephine is dictated by the encephalographic findings or by the constant localization of headaches. A small opening is left in the dura mater to permit drainage beneath the muscular coat or into the subcutaneous tissue. Drainage rarely persists for more than a few days, as bulging of the cerebral cortex tends to obliterate the space, thus precluding reaccumulation of the fluid.

CONCLUSIONS

1. A survey of traumatic head injuries, covering a period of 10 years, has led us to observe 57 patients suffering from post-traumatic localized serous meningitis or hygroma.

2. The same pathological entity can be witnessed both in the subdural or basilar spaces following a neighbouring infection which might seem negligible.

3. We feel that clinical features are sufficiently characteristic to permit us at least to suspect the existence of this lesion and to justify our classification of these patients into 3 definite groups.

4. Each group belongs to a definite category with diagnostic and therapeutic measures particularly to each one.

5. Of the 57 observed cases, 11 are reported in detail, one of which was the result of serious inflammatory process.

HEART DISEASE AND MASS MINIATURE RADIOGRAPHY

M. I. BOSTOCK, M.A., B.M.B.Ch., M.R.C.P.* and WILLIAM MORRIS, M.D.C.M., *Vancouver*

THE RESULTS obtained by Mathisen *et al.*,[1, 2] have shown that an appreciable number of cases of heart disease can be detected by mass miniature radiography surveys where the primary object is the unmasking of pulmonary tuberculosis.

It was felt that, as a sequel to Mathisen's survey here, the investigation of doubtful or abnormal cardiovascular silhouettes discovered at the Vancouver Unit of the Division of Tuberculosis Control should be continued on the same routine basis as suspected pulmonary lesions, and this report is a summary of our findings during the first six months, from December 1950 to May 1951 inclusive.

Emphasis was placed more on the clinical and sociological implications of the detection of heart disease than in the previous survey, which was more concerned with incidence, and consequently a rather different approach was adopted and the results obtained are not strictly comparable.

Films showing suspected cardiovascular abnormalities were selected daily (W.M.), and were subsequently checked (M.I.B.) for recall if investigation seemed indicated. Experience of the limits of normality gained in the previous survey and the fact that only cases thought to be definitely abnormal were selected, led to a smaller proportion of recalls—137 out of a total of 18,643 compared with 158 from 7,009 films in the 2 months of Mathisen's survey.

Since people submitting themselves for radiography were drawn from all walks of life, and many were referred by their own doctors, it was deemed advisable wherever possible to obtain the private physician's approval before summoning a suspected case for examination, in order to avoid any suggestion that a public service was attempting to encroach upon the field of private medicine. For this reason, some fourteen cases who were found to be already receiving medical attention for known heart disease were not followed up.

A further total of 33 cases could not be traced, died, or were for various other reasons unable to attend.

Of the remainder, 90 were seen and investigated clinically, fluoroscopically and when necessary electrocardiographically: where heart disease was discovered a report was either sent to the private physician concerned, or the patient was referred to the Cardiac Out Patient Clinic at the Vancouver General Hospital.

Some 32 cases in this group were found to have no demonstrable cardiovascular disease, and in 25 the causes for the apparent abnormal cardiac silhouettes are shown in Table I.

TABLE I.

i. Obesity or outstanding physique	16 cases
ii. Prominent pulmonary conus simulating mitral stenosis in young people	6 cases
iii. Pregnancy	2 cases
iv. Achondroplasia	1 case

A further 34 cases were found to have arteriosclerotic or hypertensive heart disease with cardiac enlargement.

TABLE II.

i. Hypertension alone	22 cases
ii. Angina Pectoris	7 cases
iii. Cardiac infarction with diagnostic E.C.G. changes	2 cases
iv. Associated obesity	17 cases

Sixteen cases were found to have valvular heart disease.

TABLE III.

i. "Pure" mitral stenosis	8 cases
ii. Combined mitral and aortic valvular disease.	7 cases
iii. Luetic aortic incompetence	1 case

Seven cases were found to have congenital heart disease, and in addition one child was spotted who was not examined as he had been submitted to the Blalock operation for Tetralogy of Fallot 2 years earlier. It is interesting that the other cases were all young adults in reasonably good health.

TABLE IV.

i. Atrial septal defect	5 cases
ii. Ventricular septal defect	1 case
ii. Pulmonary stenosis	1 case

No cases of "endocrine" heart or of aortic disease were discovered, nor were any cases of true

*Heart Station, Vancouver General Hospital, Vancouver, B.C.
From the Vancouver Unit, Division of Tuberculosis Control, Provincial Board of Health of British Columbia.

cor pulmonale, although one man with gross congenital sternal depression was found to have an enlarged and distorted heart.

Of the three groups with morbus cordis, it appeared that the numbers previously undiagnosed ("A"), and those who although known to have heart disease were not attending doctors ("B") were as shown in Table V.

TABLE V.

	"A"	"B"
Arteriosclerotic heart disease	7	2
Valvular heart disease	2	4
Congenital heart disease	3	2

CONCLUSIONS

This survey, which covered a wide range of the population of Greater Vancouver, including school children, factory employees and private citizens of all age groups, confirms that while miniature films can be very misleading in the detection of borderline cases of cardiac enlargement, a sufficient number of cases of heart disease can be detected to make their follow-up very much worth while if the greatest benefit is to be obtained from the expenditure of public money on tuberculosis control surveys.

The main cause for the misdiagnosis of cardiac enlargement appears to be obesity with high diaphragm and transverse-lying heart, while the distortion produced by the proximity of the x-ray tube to the plate will always tend to exaggerate any apparent enlargement, as has been shown by Roger and Maclean[3] and by Thompson and Jellen.[4]

However it is only by individual experience of the limits of normality of the cardiac silhouette, correlated with the clinical findings, that an undue proportion of unnecessary recalls can be avoided.

The authors wish to thank Drs. W. H. Hatfield, G. F. Kincade, G. F. Strong and A. K. Mathisen for their help and advice in carrying out this survey.

REFERENCES

1. MATHISEN, A. K., MORRIS, W. AND WILSON, G. B.: *Am. Heart J.*, 39: 4, 505, 1950.
2. FLANCHER, L. H.: *Am. Rev. Tuberc.*, 17: 375, 1948.
3. ROGER, A. AND MACLEAN, A.: *Brit. Heart J.*, 11: 264, 1949.
4. THOMPSON, W. P. AND JELLEN, J.: *Am. Rev. Tuberc.*, 17: 379, 1948.

THE COSTOBRACHIAL SYNDROME*

JOSEPHUS C. LUKE, M.D., F.R.C.S.[Eng.& C.], *Montreal*

MY TOPIC concerns a rather small group of patients who seek help because of neurological symptoms in the shoulder, arm and hand and who may have associated symptoms and signs of deranged circulation to the upper extremity. This costobrachial syndrome with its neck and arm pain is a very definite organic entity. Prior to fifteen years ago, the costobrachial syndrome was relatively unknown and such vague terms as brachial neuritis or fibrositis were used as diagnoses. At present, our knowledge is much more exact and, with an understanding of the possibilities and a careful appraisal, one can usually find the particular anatomical abnormality at fault.

To understand the mechanism, some knowledge of the anatomy of the base of the neck is necessary (Fig. 1). The subclavian artery arises from the innominate on the right side and the aorta on the left. It arches upward out of the thorax into the root of the neck and passes between the scalenus anterior and medius muscles to cross over the first rib and thence to the arm. The brachial plexus has much the same pathway except that the lateral and middle cords descend from the neck while the medial cord arises from C7 and T1. The artery and brachial plexus converge on the arm and must pass through the narrow aperture between the two scalene muscles. Two other points of possible compression also exist but in lesser degrees of importance, namely where the nerves and vessels pass beneath the arch formed by the coracoid process of the scapula and the inserting pectoralis minor muscle also where the neurovascular structures cross the first rib in the narrow space beneath the clavicle.

Normally these possible points of compression are not pathological except where anatomical abnormalities are present or where prolonged abnormal positions of the shoulder girdle are maintained. All of us have undoubtedly experienced the sensation of having the arm "go to sleep" after sleeping on the side with the arm by your side or sleeping with the arms over the head. In certain individuals, neurovascular compression is more continuous due to the presence of a cervical rib, hypertrophy or spasm of the scalenus muscles or drooping of the shoulder girdle the result of occupation or muscular weakness. It is only this abnormal group who will

*From the Surgical Service of the Royal Victoria Hospital. An address presented to the Ontario Medical Association, May 24, 1951.

Canad. M. A. J.
Feb. 1952, vol. 66

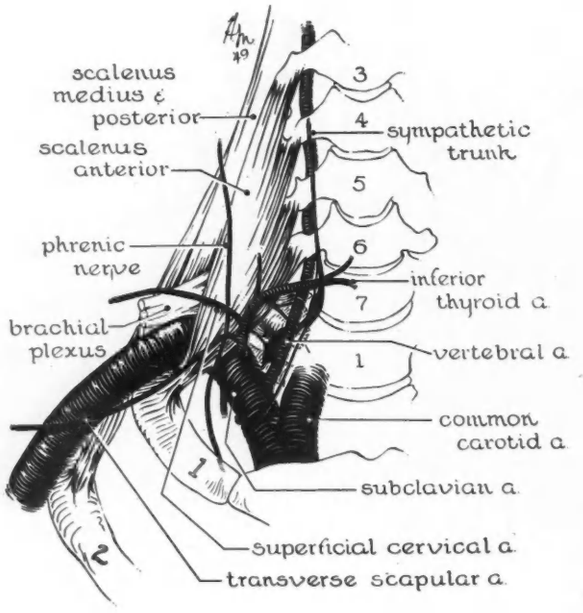


Fig. 1

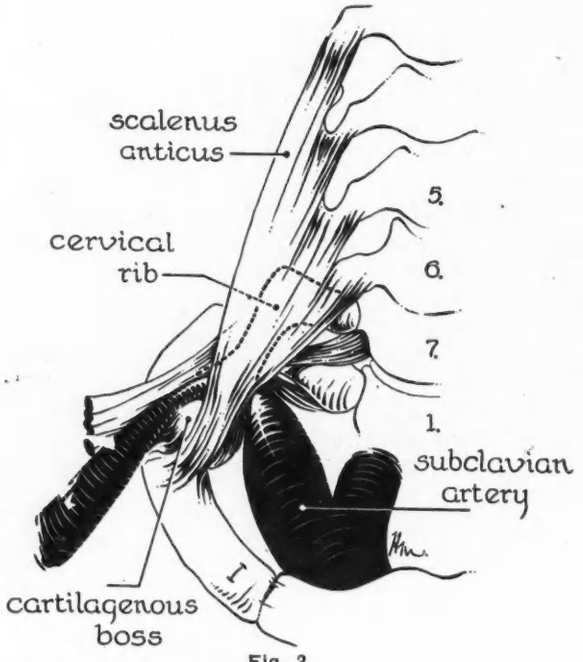


Fig. 2

Figs. 1 and 2.—Normal anatomy at the base of the neck.

ever find their way to the doctor's office. When costobrachial compression is suspected, it is necessary to attempt a differentiation of the following four varieties: in order of frequency they are: (1) Scalenus anticus syndrome. (2) Cervical rib. (3) Costoclavicular compression. (4) Hyperabduction syndrome.

As previously mentioned, the signs and symptoms of this syndrome are of two main types, the neurological and the vascular. One or other may predominate, but those with neurological complaints only are twice as common as those with vascular abnormalities.

CERVICAL RIB

The existence of this abnormal accessory rib which arises from the seventh cervical vertebra has been known since antiquity and the first operation for its removal was done in 1861. This abnormal rib varies in its extent from a complete one articulating with the first rib to that of a small stub barely projecting beyond the seventh transverse process. The x-ray reveals only the bony portion but it can be extended by a cartilaginous or fibrous continuance to its attachment to the first rib. The subclavian artery and the components of the brachial plexus must pass over this accessory rib on their way to the arm and are subject to pressure against the rib by the scalenus anticus muscle.

To give an idea of the clinical findings in this condition, I would like to review briefly a series of 40 cases found in persons admitted to the Royal Victoria Hospital since 1934. Of the 40 cases, 29 (72.5%) were female and 11 (27.5%) were male. This proportion conforms to other reported series. Only half the group had any symptoms referable to their abnormal rib and it is likely if the general population were x-rayed routinely, a higher proportion of symptomless ribs would be found. In the 20 with symptoms, 17 showed sensory changes including pain and diminution of sensation over some portion of the upper limb. Fifteen of the 20 showed motor weakness and 8 showed vascular phenomena which included ulceration and gangrene of one or more finger tips, coldness and trophic ischæmic changes. Two cases simulated Raynaud's disease very closely. In the group of 40 cases, 25 (63%) were found to have bilateral and 15 (38%) unilateral cervical ribs. Of the 15 unilateral ribs, 9 were on the left side and 6 on the right side.

At this point, may I digress a little to inject a word of warning in making the diagnosis of idiopathic Raynaud's disease. All the signs of acute vasospasm with the finding of blanched fingers, coldness and numbness can be produced by three of the mechanisms which comprise the costobrachial syndrome. The possibilities of cervical rib, scalenus syndrome or costobrachial compression should be excluded before the diagnosis of true Raynaud's disease is made.

The symptoms in our series of cervical rib appeared in late young to middle life and it might well be asked why the symptoms from a congenital lesion are so late in appearing or why so many people with cervical ribs never have any symptoms. The answer probably depends on two factors, namely occupation, and the tone of the musculature of the shoulder girdle. Toward middle life muscle tone decreases and prolonged working stooped over a desk or carrying heavy weights on the shoulders or in the hands will accentuate the compression to the point of causing symptoms.

Treatment in our series of cases comprised conservative management in 5 cases and surgical therapy in 15. The conservative treatment included change of occupation and physiotherapy designed to strengthen the musculature of the shoulder girdle. The surgical treatment consisted of division of the scalenus anticus muscle in all cases and in two only was it thought necessary to resect a portion or all of the cervical rib.

SCALENUS SYNDROME

The first reports of this syndrome were recorded by Ochsner, Gage, De Bakey and Naffziger in the mid-1930's. In essence, the condition consists of the signs and symptoms of cervical rib but without evidence of such a rib being present. Pain in the arm from the deltoid region distally is present and vascular ischæmia either organic or spastic may be associated. No cervical rib is seen on x-ray but clinical evidence of varying degree of neurovascular compression is easily found. This can be deduced from the history of "pins and needles" sensations in the hands on carrying heavy weights or sleeping on the side with the arm by the body both rapidly relieved by a change in position. This finding is analogous to the same symptoms in the foot when one knee has been crossed over the other for a prolonged period or where one has been sitting with the legs hanging over the edge of a sharp surface. As in cervical rib, the arterial compression can be sufficiently severe to cause aneurysmal dilatation of the subclavian artery proximal to the point of compression and even sufficient arterial damage to result in thrombosis of the artery.

In all the anatomical varieties of costobrachial compression evidence of arterial compression can be readily found on clinical examination. The test is now known as the Adson manœuvre and is carried out as follows: (Figs. 3, 4, 5). The patient stands sideways to the seated examiner with the arms dependent. Fingers are laid on the radial pulse and the patient is instructed to extend the head and neck. In severe degrees of compression a fading or obliteration of the pulse and a drop in oscillometric readings and the blood pressure in the arm is found. In less severe involvement, no change occurs in

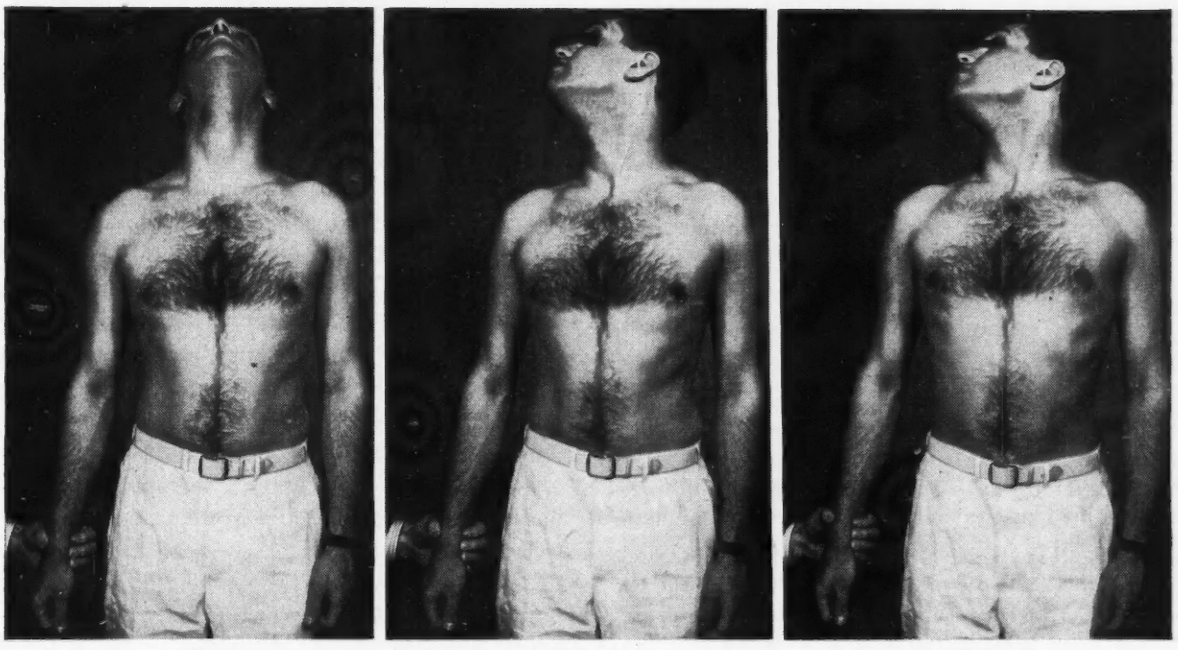


Fig. 3 Fig. 4 Fig. 5

Fig. 3.—Adson manœuvre to demonstrate neurovascular compression at the base of the neck. Step I (see text). **Fig. 4.**—Adson manœuvre. Step II. **Fig. 5.**—Adson manœuvre. Step III.

the first stage of the test. The patient is then instructed to turn the hyperextended head and neck to the affected side and the pulse again assessed. The third step is the drawing of a deep breath with the head and neck in the second position. In positive cases, pulse volume diminution will occur, arm pain will be accentuated and frequently "pins and needles" sensation appears in the fingers. The opposite upper extremity should also be tested. Some doubt on the validity and significance of these findings has been expressed because about 20% of normal people show partial or complete occlusion of the pulse on performing these manœuvres. But, in my opinion, when a patient complains of shoulder arm symptoms, particularly where vascular symptoms are present and where the differential diagnostic points have been ruled out, then these findings are confirmatory of a diagnosis of costobrachial syndrome.

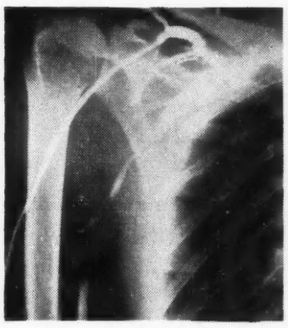
A further positive sign is local definite tenderness to pressure over the insertion of the scalenus anticus muscle into the first rib. Auscultation over the subclavian vessels should always be carried out in all these cases seeking for bruits over the artery. A localized bruit indicates narrowing due to compression and this bruit will be accentuated by downward pull on the shoulder girdle and disappears on elevation of the shoulder.

Treatment for scalenus anticus syndrome should be surgical. Exposure and section of this muscle can be done under local anæsthetic through a 4 cm. incision above and parallel to the inner third of the clavicle. The phrenic nerve is protected as it lies on the surface of this muscle and the scalenus anticus is sectioned close to its insertion and allowed to retract. Where marked vascular signs have been associated with cervical rib or scalenus anticus syndrome it is best to continue through this incision and carry out an upper dorsal sympathectomy removing the stellate, first and second dorsal ganglia.

COSTOCLAVICULAR COMPRESSION

Compression of the neurovascular bundle between the clavicle and the first rib is a possibility and it is surprising that it occurs so seldom. In the normal subject this aperture is about the width of the thumb and can be markedly reduced by dragging on the arm. Anything producing a chronic downward drag on the shoulder girdle such as hod carrying, heavy shoulder packs or carrying heavy suitcases can give this syndrome. In this lesion, the nerves, artery and subclavian vein are compressed against the first rib by the clavicle and its underlying subclavius muscle. The venous obstruction is an important point in diagnosis because the vein is not involved in cervical rib or scalene compression because of its anatomical position.

The signs and symptoms of costoclavicular compression are again neurovascular compression and are similar to those of cervical rib and scalenus anticus syndrome but, as just mentioned, there is the added factor of evidence of partial venous obstruction in the extremity. With the arms hanging by the sides the superficial veins are engorged and show increased tension and the hands have a cyanotic tinge. Venography in this position will show a pinching off of the vein shadow at the level of the first rib (Fig. 7). A normal venogram of the costoclavicular area is shown in Fig. 6. The Adson test is usually negative. Frequently x-ray will reveal an abnormality of the first thoracic rib on the affected side, either bifid, markedly broadened or elevated because of congenital abnormalities in the thoracocervical spine.



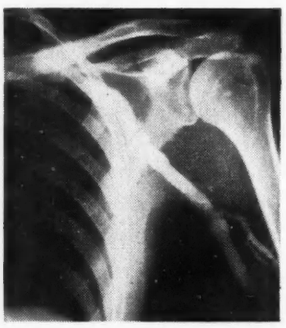


Fig. 6.—Normal venogram of the upper extremity and costoclavicular area. **Fig. 7.**—Dilated brachial and axillary vein in a case of costoclavicular compression. Note the pinching off of the vein at the level of the first rib.

Treatment is primarily conservative, with a change in occupation definitely indicated. Exercises to strengthen the muscles of the shoulder girdle are also beneficial. If such measures fail (and this is rarely so) then excision of a portion of the first rib over which the vessels pass is indicated to increase the space for the neurovascular structures. The surgical approach for this operation is difficult and usually requires temporary division of the clavicle to give adequate exposure. Surgically simpler, but possibly not so effective is division of the anterior and

middle scalene muscles to allow dropping of the first rib and prevent its elevation on respiration and straining.

The mechanism of costoclavicular compression is probably also the cause of acute axillary vein thrombosis, the so-called effort or strain thrombosis. Acute severe pinching of the vein after unaccustomed strain to the shoulder girdle is sufficient to cause a descending venous thrombosis originating at the point of vein trauma.

THE HYPERABDUCTION SYNDROME

Those people who continually sleep with their arms above their head or work with their arms over their head (ceiling painters, grease pit mechanics, etc.) may develop neurovascular symptoms in the arms and hands. One case is reported by Wright where gangrene of a finger resulted. A history of prolonged arm elevation is necessary for a correct diagnosis plus the finding of pulse obliteration on abducting the arms to 90 degrees or higher. The Adson manœuvre is negative and no cervical rib is present. Again, many normal people show pulse obliteration on hyperabduction of the arms but this obstruction does not become pathological unless long continued. Those who have painted or washed a large ceiling know the excessive arm fatigue which results. This is undoubtedly a mild manifestation of the hyperabduction syndrome.

The point of compression in these cases is debatable but it can be shown by dissection that where the neurovascular structures pass beneath the coracoid process of the scapula with its attached pectoralis minor, angulation of the bundle occurs on abduction. Tightening of the costocoracoid membrane in abduction is also probably a factor. As mentioned previously, this compression is physiological and only becomes pathological when long continued.

Treatment is simple and consists in preventing the excessive hyperabduction. Change in occupation and sleeping with the arms at the sides will usually relieve symptoms. Before closing, I would like to mention the differential diagnosis which should be continually kept in mind. When arterial ischæmia of the fingers predominates with evidence of trophic changes, Buerger's disease should be excluded. As will be recalled, about 30% of Buerger's will show upper extremity involvement of some degree. Examination of the legs will also show arterial disease to be present and will reveal the true diagnosis. As I mentioned previously, consider every case of Raynaud's disease as being due possibly to costobrachial compression. In the absence of any signs of compression and with a true history of vasospastic attacks on exposure to cold and emotion a correct diagnosis can be made. Where neurological signs and symptoms are present in the arm without vascular phenomena, a cervical disc should be kept in mind. A history of previous neck trauma increased pain on coughing, straining and hyperextension of the neck in the absence of signs of neurovascular compression will indicate the true condition. Rarely will osteoarthritis of the cervical spine with root compression be a factor but its presence can be seen on careful x-ray studies. Lesions of the shoulder joint itself should be easy to differentiate.

The medical conditions of vitamin B deficiency, diabetic neuritis and the arm pain of coronary disease should not be difficult to rule out if they are kept in mind.

In conclusion, I would like to emphasize that cases of costobrachial compression are not common but, if these mechanisms are kept in mind, we will have the solution to the occasional puzzling case of upper extremity symptoms.

RÉSUMÉ

Le syndrôme dont il est question ici est un phénomène de compression, dont les signes sont neurologiques et vasculaires. Il en existe quatre variétés.

1. La côte cervicale, qui est une côte accessoire attachée à la septième vertébre cervicale, et qui entraîne une compression de l'artère sous-clavière et du plexus brachial. Ici les symptômes vasculaires ne doivent pas être confondus avec ceux d'une maladie de Raynaud.
2. Le syndrôme du scalène, qui donne les mêmes signes de compression que la côte cervicale mais sans les signes radiologiques de cette anomalie.
3. Compression costoclaviculaire. Il s'agit toujours ici de compression neuro-vasculaire mais cette fois l'obstruction de la veine sous-clavière ajoute ses signes au tableau. C'est un syndrôme que l'on recontre surtout chez dont la profession est de porter des poids lourds sur les épaules.
4. Le syndrôme de l'hyperabduction que l'on recontre surtout chez les sujets qui travaillent les bras élevés audessus de la tête ou encore qui dorment dans cette position. En somme tous des cas de compression costobrachiale, et si l'on veut penser à tous les mécanismes énumérés ici on aura facilement la solution des symptômes les plus communs aux extrémités supérieures.

Penicillin therapy should be given at any time to syphilitic pregnant women short of actual delivery. If it is too late to prevent infection, such treatment is very effective in "curing" the condition of an infected fetus *in utero*. Adequate penicillin therapy given during pregnancy is nearly 100% effective in the prevention of congenital syphilis or in curing an already infected fetus *in utero*, provided further serologic and clinical progress is satisfactory.—L. W. Shaffer and C. J. Courville: *Arch. Dermat. & Syph.*, January, 1951.

Canad. M. A. J.
Feb. 1952, vol. 66

SPONTANEOUS ABORTION—DIAGNOSIS AND TREATMENT*

CLYDE L. RANDALL, M.D.† and
PAUL K. BIRTCH, M. D., *Buffalo, N.Y.*

SPONTANEOUS ABORTION is considered the unintentional interruption of pregnancy before the twentieth week of gestation. For many years recognition of a problem, then improvement of therapy and finally dissemination of the knowledge acquired, have proved a successful formula in obstetrics and gynæcology. The woman with symptoms of gynæcologic cancer now seeks examination early and pelvic malignancy is often recognized at a stage when treatment cures the lesion. In like manner, continued educational and therapeutic efforts are materially reducing maternal mortality and infant loss. Therefore, when we stop and realize that spontaneous abortion terminates more lives than gynæcologic malignancies and the hazards of childbirth combined, our responsibility is evident.

Spontaneous abortion is thought to occur frequently, but the actual loss is difficult to determine. Several reports have suggested that 20% of pregnancies terminate before the child is viable. This impression has, undoubtedly, been aided by repetition of the somewhat related statement that 20% of women who conceive experience an abortion (but 20% of the conceptions do not abort). Even if such estimates could be substantiated, an average figure gives little indication of the risk of abortion in any given pregnancy, for, in the single instance, a number of individual factors must be taken into consideration. Tietze, Guttmacher, and Rubin[1] have reported an over-all incidence of only 7% abortions among 1,497 successive pregnancies observed in their practice. They conclude that the incidence of abortion is significantly increased in older women, particularly when they give a history of previous abortion or a period of infertility preceding conception. Tietze's *et al.* figures and our own observations seem to agree with the incidence in Metropolitan New York, where all instances of pregnancy are reportable.

In the five years 1944 to 1948 inclusive, of 708,045 pregnancies recorded by the Health Department, 33,554 or 4.7% terminated before the twentieth week of gestation. Since Baumgartner[2] has estimated that 50% of the pregnancies aborting in the City of New York may not have been officially recorded, it seems reasonable to estimate that at the present time not more than 10% of conceptions are terminating before the fetus is viable. Ten per cent of abortions in 200,000 annual conceptions would result in the loss of 20,000 lives per year in Upstate New York alone, as compared to approximately 2,500 deaths from gynæcologic cancer and 200 maternal deaths per year. In considering the abortion problem we should also keep in mind the fact that 10 to 15% of maternal deaths follow the occurrence of abortion before the 20th week.

ETIOLOGY OF ABORTION

It is generally agreed that one-third to one-half of the conceptions that abort are lost because of defects that are irreparable by the time the woman first suspects she is pregnant. We need means of determining whether impending abortion is or is not due to embryonic or decidual defects that are incompatible with fetal survival. Until such criteria are available, we have been faced with the choice of treating all women threatening to abort (or with a history of habitual abortion)—or treating none of them—without means of determining in which instance our efforts could possibly succeed.

The studies of Mall,[3] Streeter,[4] Rock and Hertig[5] enable us to estimate that 30 to 40% of spontaneous abortions are due to malformations of the embryo or decidua. On the other hand, Hertig's[6] studies also imply that as many as 60 to 70% of aborted pregnancies might have been salvaged by proper treatment. Power[7] observed evidence of decidual separation and external vaginal bleeding in early pregnancy—without appreciable damage to the surviving fetus. His report suggests that when abortion threatens but does not occur, there is no increased possibility of the conception eventually resulting in a malformed or inferior child.

Many clinicians have observed hormone therapy prove effective to a point of inhibiting the progress of spontaneous abortion. Since we are unable to recognize defective germ plasma before it aborts, it is reassuring to note that when the conceptus is abnormal and we employ measures adequate to inhibit abortion, we only increase the incidence of clinically "missed abortions". Effective treatment of threatened abortion does not seem to increase the incidence of abnormal or defective children.

We will not discuss defects of the spermatozoa or ovum, nor attempt to evaluate deficiencies in

*Read at the Annual Meeting of the Ontario Medical Association, May 23, 1951.
†University of Buffalo, Buffalo, N.Y.

the site or process of nidation. Such etiologic factors, frequently responsible for spontaneous abortion are from a practical standpoint so interrelated as to often appear inseparable. It seems evident that although the conceptus may be normal at the time of fertilization, a deficiency of the reproductive organs may limit vascularization at the actual site of implantation. The resulting inadequacy of decidual development may result in serious impairment of early fetal nutrition, irreparable damage of the conceptus and the eventual appearance of aborted tissues interpreted by the pathologist as evidence of defective germ plasma. The congenitally incompetent uterus is often difficult to recognize. Women with a bicornuate uterus often conceive and deliver without difficulty that can be attributed to uterine abnormality. On the other hand, the much maligned infantile uterus merely reflects the hypo-gonadal status of a woman in whom abortion, after a period of apparent sterility, is not surprising.

Hughes[8] has shown endometrial deficiencies accounting for inadequate nutrition in the critical early stages of implantation, with resulting abnormal development of the decidua and early abortion. For patients with a history of habitual abortion, he emphasizes a regimen preparing the endometrium before conception by pre-ovulatory priming of the endometrium with small doses of œstrogen. In all probability the increased vascularity achieved should be supported throughout the first half of pregnancy by adequate hormone dosage.

In this connection, we should remember that a persisting inadequacy of the placenta may prove disastrous to the fetus shortly before delivery is due. It is probable that both dietary and hormonal means of assuring adequate placental nutrition are as necessary in the last months as in early pregnancy. In a recent review of the factors accounting for fetal death among deliveries in the Buffalo Hospitals during 1948-49, Baetz[9] noted that early abortion and the factors resulting in premature labour or fetal death, tend to reoccur in the same individuals.

A variety of events may accidentally affect the welfare of the conceptus. Frequently overlooked among such possible etiologic factors is the actual time of fertilization. The age of the ovum and sperm when union occurs is unpredictable and uncontrollable. An ovum or sperm accidentally old at the time of fertilization may be incapable of adequate development upon reaching the endometrium. What has been termed prolonged transportation time may also result in devitalization of the early conceptus, impaired development and inevitable abortion. The actual site of implantation is perhaps equally important, and, unfortunately, cannot be controlled.

Extra pelvic factors.—There are few conditions in the woman's systemic health that actively cause abortion but many factors interfere with decidual, fetal or placental development, and in a more passive manner eventually terminate pregnancy. For instance, we do not believe that serologic incompatibility is a factor in the causation of abortion, but it is important to remember that an Rh negative mother may become sensitized, by even an early aborted pregnancy, to a degree that will endanger the outcome of future childbearing. Occasionally abortion may be due to industrial or home acquired toxicity. There is no time to discuss the evidence that emotion and nervous tension exert a profound effect on fertility and abortion. As a rule, to be convinced, one need only to witness the childless couple who both realize offspring in the second marriages, or to see the childless couple demonstrate fertility after adopting a child.

Habitual abortion.—While abortions are frequent and people have many children, mere dependence upon a law of averages does not increase the probability of parenthood for the childless couple. According to statistics, their chance of having a child decreases each time conception fails to go to term. After two successive abortions, unless adequate study and treatment are provided, the chance for a third pregnancy to go to term is usually considered to approximate 3 in 5 (60%). After 3 successive abortions ("habitual aborters") the chance of a fourth to go to term without treatment is decreased to not more than 1 in 5 (16 to 27%), and after 4 successive abortions, the chance of a live child from a fifth pregnancy is reported to be less than 1 in 20.

There is abundant evidence to suggest that nothing is gained by an arbitrary period of voluntary infertility between pregnancies. Factors possibly predisposing to abortion should be corrected and preconceptional preparation, be it the removal of disease, the use of hormones, psychological measures or a dietary regimen, may require a few menstrual cycles, but merely "waiting awhile" accomplishes nothing for the habitual aborter, and should not be advised.

Canad. M. A. J.
Feb. 1952, vol. 66

Pelvic pathology. – Cervicitis and thickened cervical leucorrhœa interfere with conception, and a widely patulous cervix in a woman with a history of repeated abortion should suggest the so-called incompetent internal os. Lash,[10] Heaney[11] and Edward Allen[12] have called attention to the importance of cervical repair when irregularity of the internal os suggests an incompetent uterine sphincter as well as when laceration distorts the visible cervix. Danforth[13] has suggested that roentgen visualization of the cervico-uterine canal by suitable opaque media is the best means of recognizing defects of the "incompetent cervix" which could be repaired.

Neoplasms are frequent in the pelvis, and therefore, often complicate pregnancy. While fibroids are often associated with infertility, they do not prevent conception nor do they prevent pregnancy from progressing to term and the spontaneous delivery of a normal infant. Nevertheless, fibroids in the uterus increase the incidence of late abortion and premature labour. In a woman in whom other possible causes for abortion seem to have been eliminated, we believe myomectomy is indicated if she has palpable fibroids, has aborted and is anxious to have a child. On the other hand, ovarian cystomas are not likely to cause abortion.

Uterine displacement, like fibroids, can be considered innocent unless circumstances suggest guilt. When we find a retroverted uterus in a patient who has aborted and is anxious to conceive again, we believe it good practise to replace her uterus and maintain it in anterior position by the use of a vaginal pessary from the time conception is desired until the pregnant fundus becomes too large to retrovert back into the cul-de-sac.

Tubal disease is not often considered a cause of spontaneous abortion. Endometriosis and chronic salpingitis are usually considered in relation to sterility, yet, whenever tubal disease does not actually occlude the tube, fixation of the fimbria or decreased ciliary action may be responsible for prolonging the time it takes a fertilized ovum to reach the endometrium.

THE TREATMENT OF ABORTION

A review of current literature indicates a few therapeutic measures of apparent effectiveness in the treatment of abortion. Perhaps we fail in many instances to recognize the management which would be most effective for the individual patient. How then, can we improve our perception of the problem? Certainly for the largest group, the abnormal and defective conceptus, we seem to have little to offer. There appears, as yet, no means of testing for the viability and integrity of early fetal and decidual development. Pelvic disease, the psychiatric or the nutritional factors accounting for abortion may be detected clinically and should be recognized by the physician. Effort may be necessary to improve the environment and systemic health of either or both parents. Apparently a large group abort because of factors effectively eliminated by adequate diet and hormone therapy. The importance of adequate diet and good prenatal management has been emphasized by Stander, Javert and Finn.[14] Even optimal hormonal therapy is not a cure-all, and glandular therapy is not indicated in many instances. In the absence of a demonstrable deficiency of corpus luteum effect, we doubt if there is good indication for the stilbœsterol-progesterone therapy so frequently and empirically employed today as a prophylactic measure in the management of early pregnancy.

Endocrine therapy.—We still see instances in which an empirical dosage of thyroid seems to increase fertility and decrease the incidence of abortion. The patient's record of daily basal temperature not only provides evidence of ovulation, it may indicate inadequate corpus luteum function. The importance of this observation has been repeatedly confirmed by endometrial biopsy. When a period of infertility has preceded an abortion, increasing the vascularity of the endometrium with small daily amounts of œstrogen during the preovulatory phase of the cycle for several months, as recommended by Hughes, should precede the next conception. Moreover, the use of œstrogen and progesterone in physiological amounts throughout the prenatal period continues to offer real hope for the habitual aborter (3 plus spontaneous abortions). Intramuscular progesterone or stilbœsterol by mouth both seem to fulfill the requirements of prophylactic or replacement therapy. However, both involve considerable expense and there is no reason to believe that either is beneficial unless an actual deficiency is present.

More study is necessary before we can interpret and evaluate reported results of œstrogen and progesterone therapy, but one observation seems evident. The incidence of abortion has been greatly reduced when women with a history of habitual abortion receive stilbœsterol

by the "Smith's regimen" or œstrogen plus progesterone in the physiologic dosage recommended by Davis and Fugo,[15] Vaux and Rakoff.[16]

Progesterone deficiency.—The clinician is not wholly dependent upon the laboratory for guidance as to the indications for replacement therapy. The apprehensive, anxious-to-be-pregnant woman is certainly more likely to abort than the happier, less tense mother who expects no trouble. The painful and large corpus luteum should suggest more than a poor tolerance of discomfort. Noticeable and painful enlargement may accompany cystic dysfunction and indicate an inadequate progesterone level. On the other hand, we have repeatedly observed that the woman with vomiting of pregnancy rarely aborts. Not only can the patient be assured that her child will not be harmed by her illness or by her temporary malnutrition, we feel her physician can also be assured that the vomiting of early pregnancy indicates an active corpus luteum and no deficiency of progesterone.

The methods of hormone assay necessary to determine if stilbœsterol or progesterone are indicated are expensive and not generally available. The need for less expensive, simpler and more available means of determining hormone levels in pregnancy is generally recognized. However, the available laboratory procedures are all time consuming, expensive and none give actual, reliable data concerning the circulating progesterone produced by the corpus luteum in early pregnancy.

DIAGNOSIS OF IMPENDING ABORTION

The epithelium of the woman's generative tract mirrors the function of the ovary and cytologic studies appear to offer a means of recognizing corpus luteum deficiency and impending abortion. Fletcher,[17] in 1940, used the vaginal smears as an aid to the diagnosis of incomplete abortion in the woman with vaginal bleeding of questionable origin. Hall,[18] in 1942, used the vaginal smear in correlating various phases of vaginal cornification with progesterone deficiency. While studying cervical cytology with respect to malignancy, it occurred to Birtch and Hall[19] that perhaps cervical epithelium would provide more reliable information concerning the function of the corpus luteum in pregnancy. They believed the vaginal smear obtained through the use of the vaginal pipette offered confusing and unreliable data in the pregnant patient. Material so obtained appears dilute, the cells are old, associated debris and infection are present in almost all cases. Moreover pseudocornification and basal cells are present all too frequently. They believe that the anterior cervix provides the best source of material and suggest it be taken with an Ayre spatula—making a sweep down from the anterior fornix on to the anterior lip of the cervix with a single stroke. This location is probably the least contaminated area of the vagina. Occasionally if discharge is present even in this location we first cleanse the anterior surface of the cervix away with a dry cotton ball and then take the smear. All erosions and the squamo columnar junction are particularly avoided. The smear is immediately fixed and stained according to the method described by Papinacolaou or Shorr. In actual practice all patients are encouraged to come to the office within three weeks after their first missed period. The cervix is exposed and the cervical smears are taken as described. Subsequent visits are at three week intervals unless the character of the smear indicates earlier re-visit. No patient is asked to come to the office if symptoms suggest a threatened abortion.

Cytologic evidence of impending abortion.—In our experience there should be no cornified cells present in such cervical smears during normal pregnancy except in the 4th to 6th week of an early gestation. We believe that increasing numbers of cornified cells mean corpus luteum failure and hence threatened or impending abortion. We have graded the increase in cornification into three classes, slight, moderate or marked. In the slight there are only scattered cornified cells present; in the moderate 20 to 30% of the cells are cornified and in the marked more than 30% are cornified cells.

Our management of the three grades of increased cornification is as follows. When the report is a *slight* increase in cornification we do nothing but have the patient return two weeks later for a repeat smear. When the report is *moderate* we also have them return in 7 to 10 days for a repeat smear—but promptly start glandular therapy. When a cornification is *marked* it has been our experience that abortion is inevitable or a missed abortion has occurred. We believe that the "marked" type of smear represents an irreversible process and that no therapy is indicated. On the other hand we would like to emphasize that at the intermediate or moderate stage of increased cornification stilbœsterol or progesterone should be started

Canad. M. A. J.
Feb. 1952, vol. 66

promptly if it is to be used at all. When the report suggests a moderate increase in cornification the smear seems to represent a reversible process with or without therapy. In other words, this moderate increase in cornification type of smear can spontaneously revert to a normal smear. However, since we have also seen the same moderate smear progress to show a marked increase in cornification without therapy we believe that if hormone therapy is to be used it is when the smears show a moderate degree of cornification. Interestingly enough with the moderate to marked increase in cornification type of smear a very interesting sidelight to this investigation has been observed. When a patient with this degree of cornification is treated with stilbœsterol according to the dosage advised by Smith and Smith, symptoms of threatening abortion often disappear. Yet, instead of reverting to a normal smear with no cornification a striking picture of complete cornification may appear. When this occurs although the symptoms of threatening abortion may have completely disappeared, we have learned that a *missed abortion* eventually becomes clinically apparent. Thus smears readily pick up this disappointing termination of pregnancy and obviate days and weeks of hopeful, expensive and unnecessary prolongation of a futile prenatal period.

We have also observed patients in whom signs and symptoms of a threatened abortion were apparent just prior to the taking of a smear or who developed signs of a threatened abortion just after the taking of a smear, who were found to have a perfectly normal type of smear—yet they aborted. We believe these patients abort for reasons other than a corpus luteum deficiency and that no hormonal therapy would have changed the outcome. It seems probable from this experience that more patients are aborting because of a corpus luteum deficiency than we had formerly believed. At least, in our experience, it seems that the majority of patients who threaten to abort are doing so on the basis of an endocrine deficiency for, the number of patients threatening to abort who have an impaired smear, far exceeds those patients threatening to abort with a normal smear.

DISCUSSION

We are convinced that cervical cytology provides a reliable measure of progesterone effect during early pregnancy. Such scrapings appear to be a reliable, inexpensive and readily available method of identifying the pregnant woman who needs progesterone, or if we accept the Smith's thesis, the progesterone stimulating effect of their recommended schedule of stilbœsterol dosage. The smears have repeatedly predicted impending abortion before clinically appreciable symptoms or signs. On the other hand, cytologic study gives no indication of progesterone deficiency in women apparently threatening to abort who do not do so and in whom vaginal bleeding eventually appears to have been of no prognostic significance as far as continuation of the pregnancy was concerned. We believe the cervical smears help us decide which patient threatening to abort can safely be permitted restricted activity and which patient should remain at absolute rest until a full progesterone effect is evident as a result of indicated replacement therapy. Cervical cytology also appears to be a reliable means of detecting "missed abortion" before the clinical manifestations of this unfortunate situation are definite enough to justify the diagnosis.

In the presentation of this subject, with deliberate intent, treatment has been considered before diagnosis. This sequence we would emphasize in the belief that to prevent abortion, we must recognize and adequately treat, in many instances before the desired conception occurs, all conditions which might seem to predispose the individual couple to abortion. Factors that account for infertility should especially be considered for they often persist and predispose to spontaneous abortion.

It is obviously necessary to have patients report for examination and the inauguration of possible treatment very early in pregnancy—ten days to two weeks over the first missed period.

SUMMARY

The so-called prophylactic use of large amounts of stilbœsterol-progesterone during early pregnancy, in an effort to reduce the incidence of abortion, appears justified only when there is a demonstrable deficiency of corpus luteum effect.

We believe the cytology of cervical scrapings provides a reliable and readily available means of recognizing the women threatening to abort on the basis of a corpus luteum deficiency.

The incidence of abortion can be materially reduced by the employment, when indicated, of well known measures readily available to the profession.

We would emphasize that the treatment of abortion must be individualized for it appears unlikely that any single cure-all can be anticipated.

REFERENCES

1. TIETZE, C., GUTTMACHER, A. F. AND RUBIN, S.: *J. A. M. A.*, **142**: 1348, 1950.
2. BAUMGARTNER, L., WALLACE, H. M., LANDSBERG, E. AND TESSIN, V.: *Am. J. Pub. Health*, **39**: 1549, 1949.
3. MALL, F. P. AND MEYER, A. W.: *Contrib. Embryol.*, **12**: 1, 1921.
4. STREETER, G. L.: *Scient. Monthly*, **32**: 495, 1931.
5. HERTIG, A. T. AND ROCK, J.: *Am. J. Obst. & Gynec.*, **58**: 958, 1949.
6. WALL, R. L. AND HERTIG, A. T.: *Ibid.*, **56**: 1127, 1948.
7. POWER, H. A.: *Ibid.*, **56**: 743, 1948.
8. HUGHES, E. C., VAN NESS, A. W. AND LLOYD, C. W.: *Ibid.*, **59**: 1292, 1950.
9. BAETZ, R. W.: Paper presented at a meeting of the Buffalo Obstetrical and Gynæcological Society, March 6, 1950.
10. LASH, A. F. AND LASH, S. R.: *Am. J. Obst. & Gynec.*, **59**: 68, 1950.
11. HEANEY, J. S.: *Ibid.*, **59**: 75, 1950.
12. ALLEN, E.: *Ibid.*, **59**: 75, 1950.
13. DANFORTH, D. N.: *Ibid.*, **59**: 74, 1950.
14. JAVERT, C. T., FINN, W. F. AND STANDER, H. J.: *Ibid.*, **56**: 878, 1949.
15. DAVIS, M. E. AND FUGO, N. W.: *Proc. Soc. Exper. Biol. & Med.*, **69**: 436, 1948.
16. VAUX, N. W. AND RAKOFF, A. E.: *Surg. Clin. North America*, **25**: 1324, 1945.
17. FLETCHER, P. F.: *Am. J. Obst. & Gynec.*, **39**: 562, 1940.
18. HALL, G. J.: *J. Clin. Endocrinol.*, **5**: 34, 1945.
19. RANDALL, C. L., BAETZ, R. W., HALL, D. W. AND BIRTCH, P. K.: *N.Y. State M. J.*, **50**: 2525, 1950.

CHRONIC FRIEDLANDER'S PNEUMONIA*

HAROLD Z. POMERANTZ, M.D.,† and EDWARD WASSERMAN, M.D.,‡
Boston, Mass.

THE MOST IMPORTANT COMPLICATION of acute Friedlander's pneumonia is the chronic form of pulmonary sepsis, which results in bronchiectasis, lung abscesses, cavitation and repeated bouts of pneumonia.[1] Reports indicate that this condition may be confused with tuberculosis, coccidiomycosis and other chronic pulmonary diseases,[2, 3a, 3b] and patients have needlessly been sent to sanatoria in the past. Because the modern and early management of chronic Friedlander's pneumonia is promising,[4] it is increasingly important to make correct and prompt diagnoses in this disease. The course, the diagnostic pitfalls and the beneficial effects of modern combined antibiotic and surgical treatment are well illustrated in 4 cases of chronic Friedlander's pneumonia seen at the Boston City Hospital during the past 12 years.

CASE 1

A 62-year old coloured man was admitted to the Boston City Hospital because of cough, shaking chills, and left-sided chest pain of 5 days' duration. Except for chronic alcoholism, the patient's past history was not significant. On arrival, he appeared acutely ill, with marked dyspnœa, cyanosis and some degree of disorientation. The temperature was 103°, the pulse 116, and respirations 50 per minute. There was dullness to percussion over the entire left chest and moist râles were scattered over this area, as well as over the lower right lung field. The heart was not enlarged, rhythm was regular and there were no murmurs. The blood pressure was 145/75. Examination was otherwise not remarkable. A sputum smear revealed Gram-negative plump rods and sputum culture showed *Klebsiella pneumoniæ* group A. White blood cell count was 2,400 with 68% polymorphonuclears and 24% lymphocytes. Chest x-ray revealed a homogeneous density of the upper two-thirds of the left lung as well as a diffuse mottling involving the right middle lobe (Fig. 1). The patient was started on sulfadiazine, 1 gram every 4 hours, as well as penicillin 40,000 units every 3 hours. He began to show progressive clinical improvement, with diminution of sputum and cough, improvement in breathing and a sense of well being. The temperature declined to normal over a period of 10 days, but during the ensuing weeks it would periodically rise to 99 or 100°, while at the same time Friedlander's bacillus continued to be cultured from the sputum. Chest x-rays revealed the persistence of disease in both lung fields with eventual development of small radiant areas suggestive of cavitation in the left upper lobe. Interestingly enough, these findings were interpreted by the radiologist as pulmonary tuberculosis, despite the fact that bronchoscopy, repeated smears, and guinea pig studies were all negative for this disease. The patient's total hospital stay was 10 weeks, at which time he was discharged to the chest out-patient department, with radiological evidence of many small cavities in the left upper lobe. Unfortunately, data as to further follow up studies are not available.

CASE 2

A 53-year old white male, a known chronic alcoholic, was admitted to the Boston City Hospital with a 3 day history of cough productive of tenacious bloody sputum, shaking chills, fever, and right-sided chest pain accentuated by deep breathing and coughing. He was dyspnœic and cyanotic with a temperature of 103°. Respirations were 36 per minute, pulse rate 132, and blood pressure 110/70. The right side of the thorax was splinted, with dullness to percussion, increased tactile and vocal fremitus, and diminished breath sounds over the upper half of the right lung field. Moist râles were audible over this area; no friction rub was heard. Sputum smear, done on admission, revealed numerous plump, Gram-negative, encapsulated bacilli. Cultures of sputum and blood yielded Type A Friedlander's bacilli. Admission chest plate revealed a circumscribed area of density extending from the right hilum into the anterior portion of the base of the right upper lobe. White blood cell count was 12,700. Chloromycetin therapy was instituted shortly after admission, 1.5 grams being administered intravenously every 12 hours. Because of failure of his temperature to subside by the 5th hospital day, chloromycetin was discontinued and streptomycin was started in doses of 0.5 grams every 6 hours. By the 8th hospital day, temperature varied from 100 to 101° and he was improving clinically with diminished toxicity and chest pain. Sulfadiazine was begun in addition to the streptomycin on the 19th hospital day, and his temperature declined to a normal level for the first time on the 21st hospital day. However, Friedlander's organisms continued to be cultured from the sputum daily. Also, serial x-rays revealed the development of extensive cavitation in the right upper lobe which persisted despite the fact that sputum cultures became negative after 40 days of treatment (Fig. 2). A right upper lobectomy was performed with an uneventful convalescence. The patient

*From the Fifth and Sixth Medical Services (Boston University) of the Boston City Hospital.
†Resident, Fifth and Sixth Medical Services, Boston City Hospital. Present address, Medical Arts Building, Montreal.
‡Resident, Fifth and Sixth Medical Services, Boston City Hospital.
Formerly Assistant-Resident in Infectious Diseases, Massachusetts Memorial Hospitals.

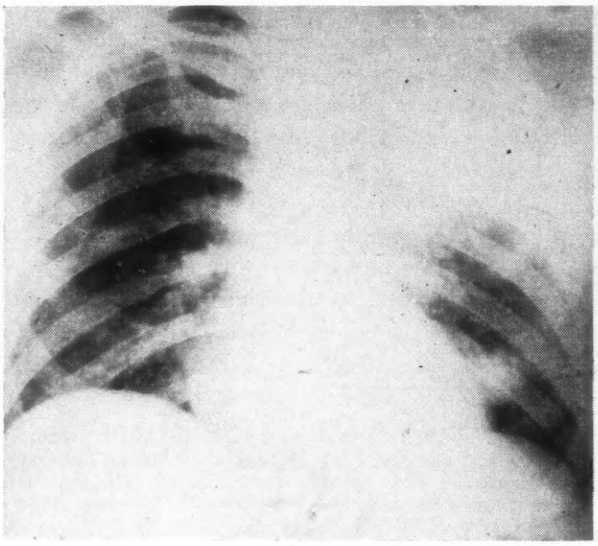


Fig. 1

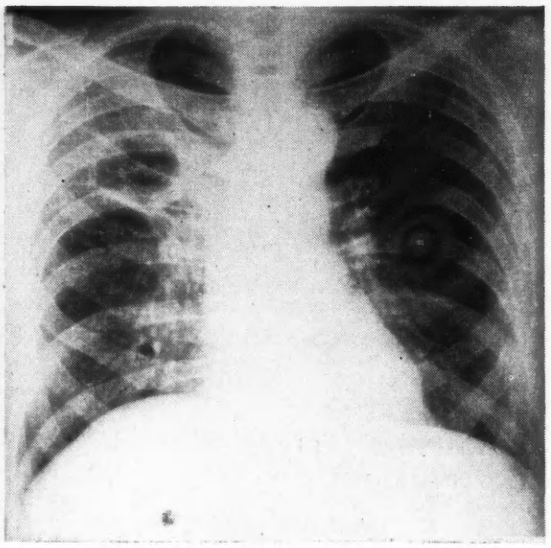


Fig. 2

Fig. 1.—(Case 1) This represents the acute phase of Friedlander's pneumonia which progressed to cavitation. **Fig. 2.**—(Case 2) This represents a phase of chronic Friedlander's pneumonia in which the acute reaction has subsided and only chronic cavitation remains.

was discharged after 88 days of hospitalization and follow-up studies have shown him to be well subsequently.

CASE 3

A 33-year old white male was admitted to the Boston City Hospital because of cough and fever of 6 days' duration. The patient had had asthma since childhood, and his periodic attacks were well-controlled with adrenalin. His present illness began with a cough which persisted and was accompanied by a temperature rise to 102°. He was given sulfadiazine by his physician and took a total of 18 gm. before his admission to the hospital. On the day of hospitalization, he developed a severe chill and coughed up 400 c.c. of bright red blood. There was no history of tuberculous contact and previous chest x-rays were normal in this regard.

The patient was a slender male, acutely ill with a respiratory rate of 40 per minute. Temperature was 102° and pulse 136. There was dullness to percussion, diminished breath sounds and scattered moist râles over a large area of the left upper and lower chest, both anteriorly and posteriorly. Other organ systems were not remarkable. The initial white blood cell count was 25,700 and subsequent counts ranged from 7,500 to 17,000. Many sputum cultures showed a mixed flora of organisms including *Klebsiella pneumoniæ*, alpha streptococcus, *Staph. albus* and at times *B. coli*. The patient's total hospital stay was 10 months with eventual death. Initially, he was given sulfadiazine gm. i every 4 hours as well as penicillin 40,000 units every 3 hours. During his prolonged stay he also received several courses of aerosol sulfathiazole and penicillin as well as blood transfusions and supportive therapy. During the first month, his temperature returned to normal with periodic elevations to 100°. He also had an increased sense of well being, but continued to bring up foul greenish sputum, occasionally blood tinged. His initial chest x-ray revealed a homogeneous density of the left upper lobe which was interpreted as pneumonia. Subsequent chest films during the first month showed a single cavity first and later multiple radiant areas scattered throughout the area of density in the left upper lobe.

During the subsequent weeks of hospitalization the patient had febrile periods lasting from a few days to a week, and although he had spells of relative well being he was usually weak, tired and anorexic. Many smears were negative for *M. tuberculosis* and 6 gastric aspirations with guinea pig inoculation showed no evidence of tuberculosis. Bronchoscopy revealed chronic inflammation in the left upper lobe bronchus. Individual chest x-rays were interpreted by the department of radiology as tuberculosis, neoplasm, lung abscesses and cyst, but on review of the serial films, the radiologist felt that the patient had had a pneumonic process of the left upper lobe which had progressed to abscess formation. Because of the limitation of the disease to the left lung, lobectomy or pneumonectomy was seriously considered but repeated exacerbations of the disease with bouts of pneumonia, fever, chills and malaise prevented surgical intervention. During the final week of life, the patient began coughing more violently bringing up foul and bloody sputum, with paroxysms that left him markedly dyspnœic and cyanotic culminating in his death. Postmortem examination revealed abscess cavities of the left upper and left lower lobes, bronchopleural fistula of the left upper lobe, loculated empyema, fibrosis of the left lung and bronchopneumonia.

CASE 4

A 50-year old white male, a chronic alcoholic, was admitted to the Boston City Hospital on 3 separate occasions over a 2 year period because of pneumonia. He entered initially with a 3 day history of left chest pain, cough, bloody sputum, chills and fever. Examination at this time revealed temperature 102°, pulse 130, respirations 40 per minute. The patient was acutely ill, with dullness, diminished breath sounds and rhonchi over the left lower lung field. White blood cell count was 6,400 and the chest x-ray showed a large area of density at the left lung base consistent with pneumonia. Cultures of the sputum and blood showed Friedlander's bacillus Type A. The patient was started on sulfadiazine 1 gram being given every 4 hours. On the fourth hospital day, the total sulfadiazine level in the blood stream was 14.4 mgm. %. Therapy was continued for 3 weeks. During this time the temperature declined to normal and both cough and sputum became negligible. Chest x-rays showed progressing clearing and the patient was discharged after a hospital stay of 4 weeks.

Four months later he was readmitted because of chills, severe right-sided chest pain, cough and hæmoptysis of several days' duration. Temperature was 101°, pulse 120 and the respirations were rapid and grunting in nature. There was dullness to percussion and many fine moist râles over the right lower lung field. Chest x-ray revealed a rounded area of mottled density in the right lower lobe as well as fibrotic densities at the left base. Sputum smear showed Gram-negative bacilli and many sputum cultures were positive for *Klebsiella pneumoniæ* type A. The patient was given 2 grams of sulfadiazine every 4 hours during the first 3 weeks and subsequently 1 gram

of sulfadiazine every 4 hours. His total hospital stay was 14 weeks. His temperature became normal in 2 weeks and his chest x-rays showed progressive clearing, although residual changes consistent with bronchiectasis and fibrosis remained in both lower lung fields. Fourteen sputum smears were negative for tuberculosis and although with prolonged therapy Friedlander's bacillus disappeared from the sputum, cultures taken from the left nostril and from the left antrum continued to be positive for this organism. X-rays of the sinuses revealed marked haziness over the left maxillary sinus. *In vitro* sensitivitiy studies indicated inhibition of growth of the organism by 6.25 units of penicillin per c.c. and consequently the patient was given a course of aerosol penicillin, while at the same time this antibiotic was instilled directly into the antrum. All measures however failed to eradicate the organism and the patient was finally discharged to follow-up clinic.

One year later he was readmitted a third time because of left-sided chest pain, chills, cough and bloody sputum. Examination revealed dullness and diminished breath sounds over the left lung field. Chest x-ray showed fibrotic infiltration at the right lung base as well as a large area of mottled density in the lower half of the left lung field. Sputum culture was positive for *Klebsiella pneumoniæ* Type A. The patient was treated with sulfadiazine 1 gram every 4 hours. His clinical picture and his chest x-rays showed progressive improvement, but Friedlander's bacillus continued to be cultured from his left nostril and left antrum. It was obvious now that this patient had a focus of infection in his left sinus, which served to initiate repeated episodes of pneumonia in a chronic alcoholic who took poor care of himself and who had underlying bronchiectasis in both lung fields as a residual of his previous Friedlander's pneumonia. Streptomycin was now available, and sensitivity studies revealed the organism to be sensitive to 3 units per c.c. The patient was consequently given a ten day course of aerosol streptomycin 1 c.c. (100,000 units) every 3 hours. At the end of this period and for the first time the organism could no longer be cultured from the left nostril and antrum and the patient was discharged to a follow-up clinic.

Discussion

Three of the cases in the present series were seen prior to the availability of the newer antibiotics (Cases 1, 3 and 4), and each in turn was treated with large doses of sulfadiazine with progression to a chronic form of pulmonary sepsis. This manifested itself as multiple cavitations of the left upper lobe in Case 1. In Case 3, similar cavitations were seen complicated by repeated bouts of pneumonia and terminating in death after 10 months of hospitalization. Postmortem examination revealed multiple lung abscesses, pneumonia and a bronchopleural fistula. Case 4 demonstrated fibrosis, bronchiectasis and chronic infection of both lower lobes with a focus of infection in the antrum, which resulted in repeated admissions for Friedlander's pneumonia.

Especially noteworthy is the contrast between Case 2 and Case 3. In the former, following prolonged therapy with chloromycetin, streptomycin and sulfadiazine, successful control of the infection was maintained, so that the residual cavitation of the right upper lobe could be successfully removed by lobectomy. This highlights the modern combined use of proper antibiotics together with surgery in the successful management of chronic Friedlander's pneumonia. By contrast, although lobectomy was repeatedly contemplated in Case 3, it could not be carried out because of repeated bouts of pneumonia resulting from inadequate antibiotic control.

From the diagnostic point of view, it is significant that in 2 of the cases (cases 1 and 3), individual x-ray films were interpreted as pulmonary tuberculosis, whereas study of serial roentgenograms showed quite clearly the progression of an acute pneumonia to multiple lung abscesses and cavitation. This observation emphasizes the need for a careful history and repeated bacteriological studies of the sputum in any case of pulmonary cavitation. With such a program, patients with chronic Friedlander's pneumonia and other mycotic pulmonary infections will not be sent needlessly to sanatoria.

Finally, it should be pointed out that the prompt treatment of acute Friedlander's pneumonia with the newer antibiotics has resulted in a significant decrease in death from this disease,[5, 6, 7] and that although there is little data available, there is reason to hope that by such management the morbidity resulting from chronic Friedlander's pneumonia will similarly be controlled.

Summary and Conclusions

1. Four cases of chronic Friedlander's pneumonia have been presented, outlining the major manifestations of this condition.

2. The combined use of modern antibiotics and surgery appears to hold great promise in chronic Friedlander's pneumonia.

3. Chronic Friedlander's pneumonia with cavitation can be easily confused with pulmonary tuberculosis and should be considered in the differential diagnosis of every case of pulmonary cavitation.

References

1. CECIL R. L.: A Textbook of Medicine, W. B. Saunders Co., Philadelphia, 7th ed., p. 341, 1947.
2. WINN, W. A.: *Arch. Int. Med.*, **87**: 541, 1951.
3a. HARRISON, T. R.: Principles of Internal Medicine, The Blakiston Co., Philadelphia, 1st ed., p. 842, 1950.
3b. WYLIE, R. H. AND KIRSCHNER, P. A.: *Am. Rev. Tuberc.*, **61**: 465, 1950.
4. WASSERMAN, E. AND POMERANTZ, H. Z.: Friedlander's Pneumonia: Report of Two Cases Treated with Chloromycetin. *To be published.*
5. POMERANTZ, H. Z., WASSERMAN, E. AND KATZ, K. H.: *Boston Med. Quarterly*, **2**: 23, 1951.
6. BISHOP, C. A. AND RAMUSSEN, R. F.: *J. A. M. A.*, **131**: 821, 1946.
7. NATARO, M., SHAPIRO, D. AND GORDON, A. T.: *J. A. M. A.*, **144**: 12, 1950.

AN OUTBREAK OF EPIDEMIC INFLUENZA AT CAMP BORDEN, ONTARIO

G. DEMPSTER, M.B., Ch.B., B.Sc.,*
D. O. COONS, M.D.† and
B. K. BUCHNER, B.A.,* *Toronto*

PUBLISHED REPORTS have shown that influenza in Canada during recent years has been of the A and A-prime types. The type of virus isolated was found in most cases to belong to the A-prime subgroup, for instance, this type was isolated in 1949 in many different provinces of Canada (van Rooyen, *et al.*, 1949) and again in 1950 from an outbreak at Bentley, Alberta (Nagler, *et al.*, 1951). However, in some areas in Canada, *e.g.*, Regina, Sask. and notably at Victoria Island, N.W.T. where there was an outbreak with a high fatality rate amongst the Eskimo population reported by van Rooyen, *et al.*, 1949, and Nagler, *et al.*, 1949, Type A virus, closely related to the old PR8 strain, was isolated. There have been no isolations of Type B virus reported during these years in Canada.

Since 1947, A prime virus has been the dominant type in most parts of the world. In that year the attention of workers in the United States was focussed upon this subgroup of the A type by the failure of the current polyvalent A and B vaccine to protect against influenza. The FM1, 1947 (Fort Monmouth) strain was adopted then as the standard A-prime strain for use as an antigen in vaccines and diagnostic tests. However, serological tests with the hæmagglutination inhibition technique (Hilleman, *et al.*, 1950, and Chu, *et al.*, 1950) have shown that even in the brief space of three years several different strains belonging to this subgroup have appeared. One of these, isolated in 1950, FW50 (Cuppett) was incorporated in the formula of the vaccine prepared for the United States Armed Forces for use in the winter, and has been employed by us as a diagnostic antigen in this work.

It is possible and indeed likely that the 1951 epidemic in Canada stemmed from a similar outbreak in Britain which broke out there about Christmas and lasted for several months. There is evidence to suggest that influenza virus spread to Britain from the Scandanavian countries, partly directly and partly via Europe which was also affected. The disease was not confined merely to these countries, for influenza was also reported during the early part of this year in Japan, the Middle East and S. America. The earliest reports of influenza in Canada came from Grand Falls in Newfoundland about the third week in January. Subsequently and very rapidly cases were reported from all over Canada. At the same time influenza was spreading rapidly in the United States. It was significant that the peak of the epidemic was reached on February 12 in areas in Canada and the United States situated many thousands of miles apart.

This paper gives an account of the course of the 1951 epidemic as it affected personnel in the R.C.A.F. station at Camp Borden with a description of the clinical features encountered and the laboratory findings with regard to the type of influenza virus involved and the antibody response in fourteen of the patients hospitalized during the first week of the epidemic.

DESCRIPTION OF THE OUTBREAK

On February 5 a sudden increase in the number of cases of upper respiratory disease was noticed at sick parade, moreover, these cases exhibited many of the features which are commonly associated with influenza. The sudden increase is well illustrated graphically in Fig. 1

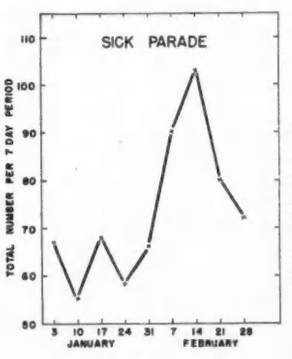


Fig. 1

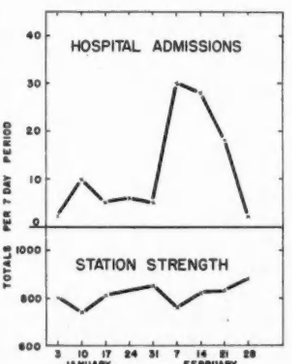


Fig. 2

Fig. 1.—Sick parade attendance. Fig. 2.—Hospital admissions and station strength.

which shows the numbers attending sick parade during the months of January and February. The single sharp peak indicates the occurrence of an epidemic disease. During the peak of the epidemic 90% of the men reporting sick had clinical influenza. The incidence of the outbreak was 247 cases out of approximately 800 personnel, or 31%, and of these 76 or 31% were sufficiently ill to require hospitalization. The numbers admitted to hospital during January and February

*Connaught Medical Research Laboratories, University of Toronto.
†Senior Medical Officer, Royal Canadian Air Force, Camp Borden.

are illustrated in Fig. 2, together with a record of station strength for that period.

Following the outbreak amongst the personnel there was a secondary wave of infection noted amongst the dependents living at the camp. Out of 700 dependents there were approximately 200 cases, the peak number of cases in this secondary wave numbered about 75.

The age groups affected in this secondary wave consisted of adults (23 to 40), school children (5 to 14), and children of pre-school age. The general impression was that the pre-school age group was the least involved, although cases did occur amongst them. The whole outbreak lasted 3 weeks.

The onset of the outbreak closely followed the arrival at Camp Borden on February 3, of a fresh draft of over 100 men from Aylmer station where they had been in training. Subsequent enquiries revealed that the influenza outbreak at Aylmer started the same week as the Camp Borden outbreak. If the original cases were imported from Aylmer, spread must have been very rapid as cases of laboratory confirmed influenza were demonstrated at Camp Borden as early as February 7 amongst men belonging to several different drafts. Such a rapid spread is common experience with epidemic influenza. It is interesting to note that the admitting clerk to the MI room was one of these earlier victims and he was followed by the mess orderly. Approximately 10% of men, in a later draft from Aylmer, who arrived at Camp Borden on February 15 contracted clinical influenza. This was despite the institution of strict quarantine at Aylmer and for 5 days subsequently at Camp Borden because of an outbreak of scarlet fever at the former place. There was no evidence of contact with any personnel recently arrived from U.K.

THE CLINICAL FEATURES OF THE OUTBREAK

The signs and symptoms of those cases diagnosed as clinically suffering from influenza.—The symptoms of this illness were, generally speaking, those of an acute upper respiratory infection associated with a marked constitutional reaction. The febrile response varied between 100 to 105° F. with a maximum temperature of 102 or 103° F. in the majority of cases. The fever was associated with a feeling of chilliness and on the average lasted 2 to 4 days; resolution was by lysis. A daily temperature rise about noon and an evening fall in temperature appeared to be a fairly constant feature of the illness. Headache, fronto-parietal in distribution, was the commonest symptom and in almost all cases there was generalized muscular aching of the neck, back and limbs, which lasted for 1 to 2 days. The most persistent symptom which occurred in 80% of cases was a non-productive cough which lasted from 2 to 4 weeks and was initially associated with considerable substernal pain. In about 75% of cases there was increased lacrimation sometimes with and sometimes without photophobia lasting for 2 to 3 days. Although a definite pharyngitis was found upon direct observation, in almost all cases the patient's other aches and pains overshadowed this and very often he did not complain about his throat. Short attacks of dizziness were complained of by some patients, generally those with higher temperatures or greater degree of malaise. Rhinitis was not a prominent symptom but was present in 50% of cases.

There was a relative absence of physical signs and apart from the ill appearance of the patient, the flushed skin, the mild pharyngitis and often a conjunctival hyperæmia, there was little to observe. No respiratory complications were encountered. Treatment was symptomatic and only 18 of the 76 patients hospitalized received any antibiotic treatment. Twelve were given procaine penicillin (300,000 units) and crystalline penicillin (100,000 units) twice daily and six others received aureomycin 2.0 gm. daily in divided doses. The illness lasted from 4 to 7 days but patients felt poorly for about 2 weeks after and many complained of a persistent cough.

Clinical features of cases confirmed by laboratory examination.—The commonest and earliest presenting symptoms were headache and a troublesome irritative cough followed in 12 to 24 hours by very marked malaise accompanied in some cases by sore throat, in others by dizziness and conjunctival irritation. Retro-sternal pain was a feature in about 25% of the cases and in a similar number the onset of illness was preceded or accompanied by a head cold. In this particular group of cases the highest white blood count at the onset of symptoms was 10,500 and in the majority of cases was between 7,000 and 8,000. All but one of these cases had recovered in five days and there were no relapses. In one case recovery was delayed until the eighth day.

METHODS AND MATERIALS

Throat washings were obtained by requesting patients to gargle with 10 to 15 ml. of saline-broth mixture. These were immediately frozen with dry ice and transported

TABLE I.

LABORATORY FINDINGS IN THE FOURTEEN CASES EXAMINED

Lab. No.	Influenza isolation	Hæmagglutination-inhibition antibody titres* A strain (PR8)	A prime strain (FM1)	A prime strain (FW50)	B strain (Lee)
AF1	None	512	512	32	64
		2048	4096	256	64
AF2	A prime	64	1024	<32	32
		512	1024	<32	32
AF3	A prime	128	512	<32	<32
		1024	8192	128	<32
AF4	A prime	128	512	<32	32
		512	4096	256	32
AF5	None	128	1024	<32	32
		512	2048	128	32
AF6	A prime	256	512	<32	256
		2048	2048	64	256
AF7	None	<32	128	<32	<32
		128	1024	64	<32
AF8†	A prime				
AF9	A prime	<32	512	<32	128
		32	8192	512	256
AF10	A prime	256	1024	32	256
		512	8192	128	256
AF11	A prime	128	512	<32	256
		16,384	16,384	1024	256
AF12	None	64	512	32	<32
		512	2048	128	<32
AF13	A prime	128	1024	<32	<32
		16,384	16,384	2048	32
AF14	A prime	256	1024	32	<32
		2048	8192	256	<32

*Figures represent the reciprocals of the dilutions (final serum dilutions). The upper figure, antibody level obtained in the acute phase and the lower figure, the antibody level 14 days later.
†Serum not obtained.

to the laboratory in vacuum flasks where they were stored at −70° C. until such time as embryonated hens' eggs of a suitable age were available for inoculation. Seven of the specimens were transmitted to the laboratory in a container cooled with ordinary ice and these spent 2½ hours in transit. In this later group, virus was isolated from six of the seven specimens.

The washings were treated with streptomycin and penicillin (1,000 units/ml.) for a period of 20 minutes prior to inoculation into the amniotic sac of 13-day old embryos. In each case four egg passages, two amniotic passages followed by two allantoic passages, were made. Eight eggs were used for each passage.

Samples of blood were taken within the first two days of illness and 14 days later during convalescence. These were titrated for influenzal antibody using the hæmagglutination inhibition test. Three standard strains A (PR8), A prime (FM1), and B (Lee) were used and a fourth strain FW50 was also included to represent a recently isolated A prime strain. Titrations were made upon plastic plates similar to the type recommended by Salk (1948). Doubling dilutions of serum were mixed with equal volumes of a fixed concentration of virus (4 hæmagglutination units). To this mixture an equal volume 0.5 c.c. of 0.5% suspension of chicken red blood cells was added. Readings were made after 45 minutes. Appropriate serum, virus and saline controls were included.

Serological analysis of the strains isolated was carried out with specific rooster antisera prepared as described by Hilleman (1950). The titres obtained were all above 1/1,000 with the exception of the FW50 antiserum which titered 1/256.

TABLE II.

THE SEROLOGICAL RESULTS EXPRESSED AS FOLD-RISES*

Lab. No.	A strain (PR8)	A prime strains (FM1)	A prime strains (FW50)	B strain (Lee)
AF1	4	8	8	0
AF2	8	0	0	0
AF3	8	16	8	0
AF4	4	8	16	0
AF5	4	2	8	0
AF6	8	4	4	0
AF7	8	8	4	0
AF9	2	16	32	2
AF10	2	8	4	0
AF11	128	32	64	0
AF12	8	4	4	0
AF13	128	16	128	2
AF14	8	8	8	0

*For statistical purposes a titre of <32 is taken as a titre of 1:16.

RESULTS

Influenza virus was recovered from the throat washings of 10 out of the 14 samples. Material obtained from the first egg passage was not tested for the presence of virus. However, rough "spot" tests with an approximate 1:10 dilution of amniotic fluid harvested from each egg of the second amniotic passage were carried out with both guinea-pig cell and chicken cell suspensions. It was found that the amniotic fluids from about half the number of the eggs of this second passage reacted positively with chicken cells. Virus appeared to be predominantly in the "D"

phase and few positive reactions were obtained with guinea-pig cells. In two cases virus was not detected until the third egg passage (first allantoic).

All the strains recovered were A prime in type. Hæmagglutination was inhibited to a significant titre by chicken antisera prepared against the FM1, and FW50 A prime strains. The hæmagglutinating properties of the strains isolated were not inhibited by PR8 or Lee chicken antisera.

The laboratory findings for each case are summarized in Table I. From these results it can be seen that in the early stages of the illness most patients had an appreciable antibody level against the PR8 and FM1 strains but little or no antibody against FW50 or Lee strains.

In Table II the serological results are expressed in fold-rises and the difference between the rise obtained with A and B types is clear-cut. In 6 of the 13 sera tested the highest fold-rise was demonstrated with an antigen prepared from an A prime strain (FM1 or FW50), in 3 cases the rise obtained with an A antigen (PR8) was equal to that obtained with A prime antigen. In 4 cases the fold-rise obtained with an A antigen exceeded that obtained with A prime antigens despite the fact that from 3 of these cases A prime virus was isolated. In case AF2 an 8-fold rise was obtained with the heterologous virus (PR8) and no rise at all with the homologous A prime strains.

TABLE III.

RELATIONSHIP OF THE CAMP BORDEN STRAIN TO OTHER "A" STRAINS

	H-I titres with rooster antisera*			
Virus	*PR8*	*FM1*	*FW50*	*AF9*
PR8	T	O	O	O
FM1	O	T	>T	T/1
FW50	O	T/128	T	T/8
AF9	O	T/4	T/1	T

*T = Titre with homologous virus; other titres are expressed as fractions of T.
O = Titre <1/32.

An antiserum was prepared in the rooster against one of the Camp Borden strains (AF9) and reciprocal hæmagglutination-inhibition tests were carried out with PR8, FM1, FW50 and AF9 virus suspensions and the corresponding roosters' antisera. A summary of the results obtained will be found in Table III. The recently isolated strain AF9 occupies a position intermediate to the FM1 and FW50 strains and appears to be more closely related to the former. It is distinct from the standard A virus (PR8). Only small differences existed between the AF9 strain and the others isolated at Camp Borden which were also tested with the same antisera.

DISCUSSION

The outbreak at Camp Borden illustrates very well the effect of the current influenza strain upon a healthy group of young men living in close association under good environmental conditions. The onset was sudden, the acute phase of the illness short, 5 to 8 days, and convalescence uninterrupted by complications in spite of the fact that few patients received antibiotic treatment. In those patients who had antibiotic treatment there was no indication that they were any better than those who had not received antibiotic. It is possible that some of these patients might have had complications due to secondary infection if they had not received antibiotic. There were no outstanding features of the illness in this outbreak but the noon temperature rise and the persistent cough were particularly noted as being relatively constant features.

In discussing the severity of the illness one has to take into account the high degree of morbidity—about one in every third person. That the cases could not be dismissed casually by referring to them as mild influenza cases can be seen from the figures for hospital admission, out of 247 cases 76 were admitted. These cases in civilian life would not be termed "hospital cases" in the usual sense but they were ill enough to require absolute rest for several days and even then did not feel fully recovered for 2 to 3 weeks after discharge from hospital. On the other hand there were no respiratory complications such as described by Harrison (1951) amongst the older age groups of the Liverpool outbreak.

The number of positive results obtained from isolations made by combined amniotic and allantoic inoculation of fertile hens' eggs was high (70%). The ten strains of virus isolated appeared to be identical and belonged to the A prime subgroup. The relationship of these Camp Borden strains to the standard FM1 and FW50 A prime strains was investigated and it was shown that they were related to both, but not identical with either of these standard strains. The results obtained with reciprocal hæmagglutination-inhibition tests indicate that the FM1 strain is readily inhibited by both the homologous and heterologous A prime antisera, *i.e.*, it behaves like the

"R" strains described by van der Veen and Mulder (1950). The FW50 strain on the other hand behaves like their "Q" strains and reacts to low titre with both the heterologous and homologous antisera of the A prime subgroup.

The strains isolated in this outbreak give a high titre with the homologous AF9 antiserum but in comparison with the FM1 strain the titres with the heterologous sera are not so high. On these grounds they might be said to correspond to the "P" strains. It is recognized that the designations "P", "Q", and "R" were applied by van der Veen and Mulder to strains classified with the aid of ferret antisera but it is felt that the results obtained here with rooster antisera are analogous.

The fact that the patients' serum levels in the early stages of the illness against the FM1 strain were considerably higher than the corresponding levels for the FW50 strain, and that the fold-rise observed was greater in most cases for the latter, might have been taken to indicate that the patients were infected with a virus very closely related to FW50 strain. However the serum antibody level cannot be taken solely as an indication of immunity (Eddy 1947) and moreover the serological analysis of the strains isolated showed that they were not identical with the FW50 strain.

SUMMARY

An outbreak of influenza due to an A prime virus closely related to but not identical with the FM1 strain, has been described. This was part of the epidemic wave which started in Canada at the end of January 1951 and subsequently spread throughout every Province with great rapidity.

These studies have been conducted as part of a research program for the investigation of epidemic influenza in Canada sponsored by the Defence Research Board, Department of National Defence, Ottawa. We are indebted to Miss C. Allison and Mrs. L. Klar for their technical assistance. For permission to publish, we wish to thank Air Vice-Marshal C. R. Slemon, Air Officer Commanding, Training Command.

REFERENCES

1. CHU, C. M., ANDREWES, C. H. AND GLEDHILL, A. W.: *Bull. World Health Organ.*, **3**: 187, 1950.
2. EDDY, B.: *J. Immunol.*, **57**: 195, 1947.
3. HARRISON, B. B.: *Brit. J. Radiol.*, **24**: 392, 1951.
4. HILLEMAN, M. R., MASON, R. P. AND ROGERS, N. G.: *U.S. Pub. Health Rep.*, **65**: 771, 1950.
5. NAGLER, F. P., BURR, M. M. AND GILLEN, A. L.: *Canad. J. Pub. Health*, **42**: 367, 1951.
6. NAGLER, F. P., VAN ROOYEN, C. E. AND STURDY, J. H.: *Canad. J. Pub. Health*, **40**: 457, 1949.
7. SALK, J. E.: *Science*, **108**: 749, 1948.
8. VAN DER VEEN, J. AND MULDER, J.: Studies on the Antigenic Composition of Human Influenza Virus A Strains No. 6, Onderzoekingen en Mededelingen Uit Het Instituut Voor Praeventieve Geneskunde, Leiden, Holland, 1950.
9. VAN ROOYEN, C. E., MCCLELLAND, L. AND CAMPBELL, E. K.: *Canad. J. Pub. Health*, **40**: 447, 1949.

CARCINOMA OF THE BLADDER: RESULTS OF TOTAL CYSTECTOMY*

FLETCHER H. COLBY, M.D.,*
Boston, Mass.

THE HISTORY of cancer of the bladder has been one of anxiety, uncertainty and disappointment. All of us have felt the gravest concern about these tumours; we often have been uncertain concerning the best method of treatment, and too frequently we have been disappointed with the outcome. In spite of our best efforts, the long term, healthy survivors of this disease have been pitifully few. For those who have succumbed, death has been the end of months of pain and suffering. This unsatisfactory situation has led to more radical measures in an effort to cure carcinoma of the bladder. We now have had sufficient experience to justify a review of the facts and to determine whether total removal of the bladder has resulted in a significantly higher long-term survival rate than other less drastic procedures. The indications for total cystectomy have been particularly difficult to define.

Since 1934, 116 total cystectomies for cancer of the bladder have been performed at the Massachusetts General Hospital. Twenty of our patients failed to leave the hospital alive, an operative mortality of about 17%. Of the 96 survivors, 66 or about 69% have died since their operation. Forty of them we know died of cancer, 15 died of uræmia, sepsis or chronic pyelonephritis and 11 died of causes unknown.

Seventy-five of our 116 total cystectomies, or nearly 65%, have died from either a recurrence of their disease or from causes which I believe can fairly be attributed to operation. Those who survived operation and then died lived on an average of about 16 months.

There are 30 or 31% of those who had total cystectomies and survived operation who are still living. Since 13 of them have been operated

*From the Urological Service of the Massachusetts General Hospital. Associate Clinical Professor of Genito-Urinary Surgery, Harvard Medical School. Chief of the Urological Service, Massachusetts General Hospital.
This study was aided by an Institutional Grant from the American Cancer Society to the Massachusetts General Hospital.

upon within about the last two years, and 22 within the past three years, these statistics are of no great value as an indication of cure. We have seen recurrences five years after operation.

Of more significance are those patients who were operated upon five or more years ago. Fifty-one patients had total cystectomies prior to 1946. Only four of them are now alive: 47 or 92% have died. About 75% of these deaths we know were due to either recurrent malignant disease, uræmia, sepsis, or chronic pyelonephritis.

These unfavourable circumstances have led us to try to determine why some patients were cured while others died either because their tumours recurred or as a result of the treatment to which they had been subjected. The records of more than 700 patients treated for carcinoma of the bladder since 1934 were reviewed. It was hoped that this study might give some clue as to why our long-term results were so poor and that it might provide a guide to more intelligent treatment.

It seemed best to go back to fundamentals and review the histological characteristics of these tumours. This work was undertaken by Dr. Walter S. Kerr and our Department of Pathology. Only those tumours were included which provided us with sufficient material to make their study complete. The tissue was secured by partial or total cystectomy or by deep and adequate biopsy. Portions of tissue removed from the surface of a tumour are not always reliable in demonstrating the grade of malignancy and afford no means of gauging the depth of tumour penetration into the bladder wall. Tumours which did not meet these requirements were discarded. In this way, there were eliminated all small localized growths of low malignancy confined to the bladder mucous membrane which are easily cured by local destruction. Such growths have confused the issue in many reports on bladder tumours and they do not concern us in this discussion. The tumours of patients about whom we had inadequate follow-up or of patients who died in the hospital were eliminated. One hundred and thirty-seven tumours were available for study. Although this represents a fairly small group, adequate material for study was present and the end-result was known in them all.[2]

A review of the histology of these growths suggested that tumour penetration into the bladder wall was an important feature. Jewett[1] has emphasized the importance of the degree of penetration of the bladder muscle in bladder tumours. Our own studies indicate that the spread of a tumour to the underlying muscle is of more significance than the size or grade of a neoplasm or its location within the bladder. Actual histological evidence of such invasiveness by a tumour is important. Clinical evidence alone that a tumour has invaded the deeper structures is not reliable, since some neoplasms are preceded by a zone of protective fibrosis that may suggest tumour infiltration. Either the papillary or non-papillary growths may invade the bladder muscle and be termed infiltrating.

After a careful review of the histology of these 137 tumours, the records were studied to see what correlation existed between the presence or absence of muscle invasion and the clinical course of the patients. The advantages and disadvantages of various methods of treatment, local destruction, partial cystectomy and total cystectomy were evaluated, depending also upon the presence or absence of muscle invasion.

In 107 cases the tumour invaded the underlying muscle of the bladder. By all forms of treatment, local destruction, partial cystectomy and total cystectomy, 11 or 10% of the patients survived for five years. Two of them developed metastases to the bones five and one-half years after operation and have died. Thirty tumours did not invade the muscle when all forms of treatment were employed. Twenty or 66% of these patients were living and well at the end of five years. There was a considerable difference, therefore, in the five-year survival of patients whose tumours did or did not invade the muscle when all different forms of treatment were used.

The results of all forms of treatment other than total cystectomy were studied to weigh the advantages of each method in the presence or absence of muscle invasion. Methods other than cystectomy were used in 100 cases: 82 of these tumours invaded the bladder muscle. Five year survivals were 9 or 11%. In 18 cases, the tumours showed no evidence of muscle invasion and all these patients were living and well at the end of five years. Local destruction and partial cystectomy, therefore, proved inadequate in controlling most of the tumours that invaded the muscle but these measures were effective in curing the non-invasive neoplasms. This is what one would expect since tumours that involve only the bladder mucous membrane should not metastasize and should be amenable to local removal or destruction.

Canad. M. A. J.
Feb. 1952, vol. 66

As a contrast to other forms of treatment, total cystectomy was evaluated for 37 invasive and non-invasive tumours concerning which we had adequate pathologic and follow-up data. The muscle was invaded in 25 cases which had total cystectomies. Five year survivals were two. Both patients developed metastases to the bones five and one-half years after operation and now are dead. When the bladder muscle was not invaded the results of total cystectomy were little better. Of 12 such patients there were but two five year survivals, 16%. Since we had no evidence that the deaths of these patients who had non-invasive tumours were from cancer, it must be assumed that these deaths resulted from the effects of operation, for abnormal body chemistry, failing renal function and sepsis were the chief causes of death. Total cystectomy, therefore, was no more effective than other measures in controlling those tumours that invaded the bladder muscle. When the tumour was not invasive and total cystectomy was employed, the five-year survival rate was considerably lower than when other forms of treatment were used.

It seemed to us, therefore, that the prognosis and treatment of bladder tumours depended a great deal upon whether or not the bladder muscle was invaded. Tumours which do not invade the muscle are best treated, whenever possible, by methods other than cystectomy. If such tumours are so extensive that cystectomy seems indicated and is done, few such patients can be expected to survive for five years although their cancer has been eliminated. Tumours which invade the bladder muscle are difficult to cure by any present method of treatment. The five-year survivals of patients with invasive tumours treated by cystectomy have been no better than when other less drastic forms of treatment were employed. After cystectomy, the incidence of tumour recurrence has been high and other deaths seem to have resulted from the operation.

Each patient who has a tumour of the bladder presents an individual problem. In trying to select the best form of treatment for these neoplasms, situations are met in which total cystectomy seems to be the only treatment that offers a chance of cure. The figures previously given refer to patients who were operated upon before 1946. Since then our operative procedures have been more extensive and yet the mortality has not increased because of better technique, transfusions and chemotherapy. Of 61 patients who had total cystectomies from 1946 to 1951, 20, or about one-third, are alive. Some of them will eventually die of cancer or from physiological abnormalities resulting from operation, but the five-year survivals, we hope, will be higher than in previous years.

In spite of the gloomy aftermath of cystectomy and transplantation of the ureters to the sigmoid, there are instances of good health and activity following this procedure which entirely justify its use. Such a case is the following:

> A storekeeper of 57 was operated upon elsewhere one and one-half years previously for a grade iii papillary tumour of the upper portion of the bladder. When seen by me the tumour had recurred and had grown through the abdominal wall in the old scar. The upper one-third of the bladder was roughened by tumour nodules. A 2 cm. lymph node could be felt in the right femoral canal. The patient's condition was excellent and the upper urinary tract was normal. He was anxious to have anything done that offered a chance of cure. In February 1949, the ureters were transplanted to the sigmoid, the bladder, prostate and seminal vesicles were removed and a pelvic lymph node dissection was performed in one stage. A large portion of the abdominal wall was excised. Twenty-eight lymph nodes from the pelvis were negative for cancer. Three weeks later bilateral femoral lymph node dissections were done. The enlarged node in the right femoral canal was positive.
>
> In spite of the unfavourable circumstances of a recurrent tumour of high malignancy that had spread beyond the bladder, this patient is now well and active two and one-half years after operation. There is no evidence of tumour recurrence and his upper urinary tract appears normal. Only total cystectomy could have accomplished this.

Dissection of the pelvic lymph nodes in patients with cancer of the bladder requires consideration. Since there are no lymphatics in the mucous membrane of the bladder, it seems reasonable that tumours which involve only the mucosa should not metastasize. The lymphatic supply of the deeper portions of the bladder, on the other hand, is very rich, so it is likely that tumours which invade the bladder muscle can readily spread to the regional lymph nodes.

Radical lymph node dissections have been performed recently in 39 patients with cancer of the bladder. Seven patients whose tumours did not invade the bladder muscle had their pelvic lymph nodes removed. None were positive for cancer. Thirty-two patients with tumours which invaded the bladder muscle had pelvic lymph node dissections. Fifteen or 47% had positive nodes.

The results of this procedure cannot be evaluated at the present time since many cases are recent. No patient with an infiltrating tumour and positive pelvic lymph nodes, however, has survived for more than one year. If the tumour does not invade the bladder muscle, pelvic lymph

node dissection does not seem to be indicated. If the bladder muscle is invaded, however, nearly one-half of these patients have no chance of cure by partial or complete cystectomy unless the pelvic lymph nodes are removed.

CONCLUSIONS

An important feature of bladder tumours is the presence or absence of invasion of the underlying muscle. Tumours that do not invade the muscle are best treated whenever possible by methods other than cystectomy. Tumours that invade the muscle are difficult to cure by any present method of treatment. Although total cystectomy for such tumours in the past has been no more effective than other less drastic procedures, there are times when cystectomy offers the only chance of cure. The high percentage of positive pelvic lymph nodes in patients with invasive tumours indicates the advisability of removing these nodes whenever adequate biopsy demonstrates the presence of muscle invasion.

REFERENCES

1. JEWETT, H. J. AND STRONG, G. H.: *J. Urol.*, 55: 366, 1946.
2. COLBY, F. H. AND KERR, W. S. JR.: *New England J. Med.*, 244: 504, 1951.
3. KERR, W. S. JR. AND COLBY, F. H.: *J. Urol.*, 65: 841, 1951.

MALIGNANT HÆMANGIOENDOTHELIOMA OF HEART*

A. J. BLANCHARD, M.D. and
H. HETHRINGTON, M.B., F.R.C.P.[C.],
Toronto

PRIMARY TUMOURS of the heart are very rare and of this group the malignant hæmangioendothelioma is among the least common.[1, 2] The diagnosis is seldom made prior to autopsy and we have been able to discover only three such instances recorded in the literature.[3] For these reasons, the following two cases of primary malignant hæmangioendothelioma of the heart are being reported. It is of interest that in one case the correct diagnosis was suggested antemortem and confirmed by biopsy.

CASE 1

B.H.P.: This 25 year old male was apparently in his usual good health until five days before admission, when he developed præcordial pain made worse on breathing. This pain was associated with a dry hacking cough and general malaise.

On examination he was found to be acutely ill with cyanosis of face, neck and upper chest, and fibrillary twitching of the facial muscles. The heart sounds were muffled, with regular rhythm and a rate of 120 per minute. The heart was enlarged to the left. The chest was clear except for a few basal râles in the left lung.

Two days after admission he developed a sharp pain in the left axilla. The heart border seemed to be extending to the left and the heart sounds were fainter. A pleural effusion was suspected. The signs of failure and the cyanosis became more pronounced and enlargement of the liver became obvious. A left pleural effusion then developed from which 700 c.c. of dark amber fluid were aspirated. This was found to be sterile on both routine culture and special culture for *M. tuberculosis*.

A week after admission a præcordial friction rub was heard but this disappeared after a few days concomitant with general improvement in the patient's condition. A month after admission a moderate fever with nocturnal sweating developed. An intracutaneous test with one milligram of Old Tuberculin was strongly positive. There was increasing cyanosis of the face, neck and upper chest suggesting superior vena caval obstruction. These signs became more pronounced over the next few days with the liver becoming much larger, the external jugular veins becoming thrombosed and the collateral veins over the chest and back becoming strikingly dilated. Five days before death he developed a sudden severe right chest pain which persisted.

Death occurred 16½ weeks from the onset of symptoms with the final clinical diagnosis being: "Obstruction of the superior vena cava due to enlarged tuberculous mediastinal lymph nodes". The possibility of primary heart tumour had not been entertained.

Autopsy.—The soft tissues of the neck were swollen and œdematous and the skin in this area was cyanosed. The *pericardial sac* was markedly dilated and when opened a large mass of blood clot amounting to about 1,000 c.c. was evacuated. In addition the visceral layers of the sac were covered with rounded tumour-like nodules measuring up to 3 cm. in diameter (Fig. 1). On cross section these were pinkish-grey in colour and hæmorrhagic areas were scattered throughout their substance. The tumour extended completely through the wall of the right auricle and projected into its lumen partially occluding the orifice of the superior vena cava. The intra-auricular mass measured about 4 cm. in all diameters (Fig. 2). The remaining chambers of the heart and the valves and valve orifices were not unusual. The myocardium generally was somewhat pale in colour but not hypertrophied and the coronary arteries were patent. The superior vena cava was patent but its right subclavian, right external jugular, left subclavian and left external and internal jugular tributaries were all dilated and filled with thrombus. The azygos and its tributaries were patent. The mediastinal lymph nodes were all enlarged and red in colour. The right pleural cavity contained 2,000 c.c. of straw-coloured fluid whereas the left pleural cavity was empty. The right lung was almost completely collapsed and throughout its substance were scattered small, firm, purplish-red nodules. Similar nodules were found in the left lung. In both lungs the nodules were generally only 3 to 4 mm. in diameter, although an occasional one as large as 1 cm. in diameter was discovered. There was no evidence of tumour arising in the bronchi nor of metastatic involvement of the peribronchial lymph nodes. The liver and spleen showed moderate chronic passive congestion and in the liver two tumour nodules were found. These measured 3 cm. and 2 cm. in diameter respectively. Both were pinkish-grey in colour and showed scattered areas of hæmorrhage. No other relevant gross findings were encountered.

*From the Pathology Laboratory and Department of Medicine, Sunnybrook Hospital, D.V.A., Toronto.

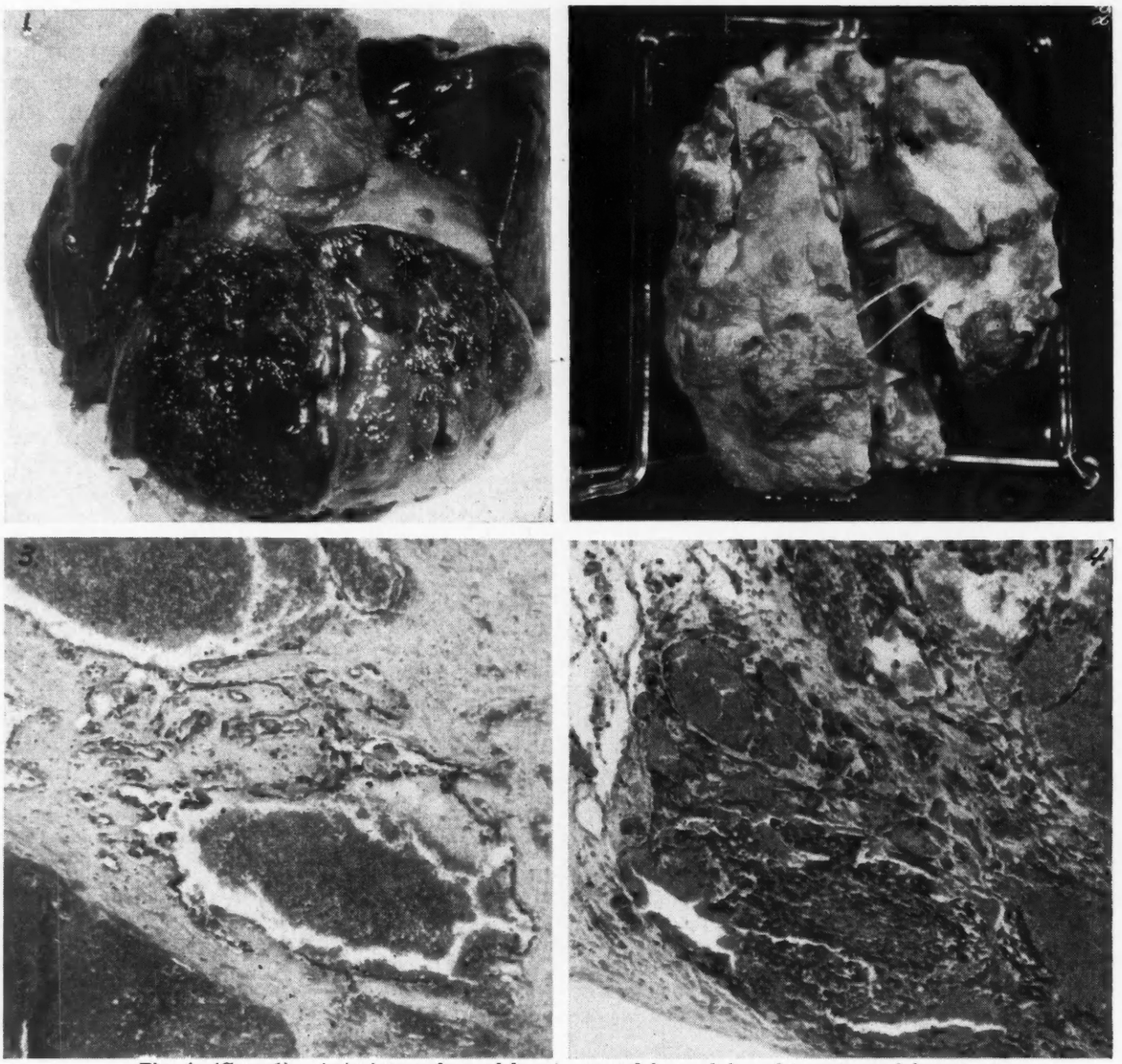


Fig. 1. (Case 1).—Anterior surface of heart covered by nodules of tumour and hæmatoma.
Fig. 2. (Case 1).—Tumour invading interior of right auricle. Arrow points to orifice of superior vena cava. Fig. 3. (Case 1).—Low power view of tumour showing neoplastic vascular channels.
Fig. 4. (Case 1).—Metastasis in lung.

Microscopic examination.—Several sections from the primary tumour in the heart showed a highly cellular tumour in which there was considerable pleomorphism. Most of the tumour consisted of poorly formed vascular spaces lined by endothelial cells and filled with blood. In other areas solid sheets of endothelial cells with scattered mitotic figures were present and there were transitions between the various microscopic patterns. There were extensive areas of necrosis and hæmorrhage. The tumours in the lungs and liver showed the same pattern but there was a more definite formation of blood vessels (Figs. 3, 4 and 5). The mediastinal lymph nodes showed no metastases but all the sinuses were distended with blood. The thrombosed thoracic veins were filled with old thrombotic material but there was no invasion of their walls with tumour growth. A small secondary tumour was found in one adrenal.

Anatomical diagnosis.—(1) Primary malignant hæmangioendothelioma of heart with metastases in lungs, liver and right adrenal. (2) Partial filling of cavity of right auricle by tumour with partial obturation of superior vena cava orifice. (3) Thrombosis of tributaries of superior vena cava.

CASE 2

G.L.M.: The patient was a thirty-three year old male, admitted with a history of anterior chest pain and increasing shortness of breath, associated with an intermittent low-grade fever and general malaise over a period of one month. The day before admission the patient developed a severe to-and-fro chest pain made worse by respiration and associated with severe pain in the right humerus.

On admission the patient was found to have a greatly enlarged heart, without any signs of failure in lungs. An aortic diastolic murmur was heard, as well as a friction rub over the præcordium. The lungs were clear but the liver was grossly enlarged. A diagnosis of rheumatic heart disease with failure was considered. The patient continued to have anterior chest pain and the electrocardiograms were considered to be compatible with a recent posterior infarct.

In view of the large heart shadow, suggesting a pericardial effusion, aspiration was carried out and 10 c.c. of a sero-sanguinous fluid, with a differential leucocyte count of 90% lymphocytes was obtained. This fluid was

sterile on routine culture and on culture for *M. tuberculosis*. In view of the findings to date, a diagnosis of primary cardiac tumour was suggested.

The patient continued to run a low-grade fever; the signs of failure increased, and a left pleural effusion developed. On aspiration, 250 c.c. of blood stained fluid were obtained. This was also negative on culture. These events were followed by a short period of clinical improvement, but a few days later he developed severe chest pain and loud pleural and pericardial friction rubs were heard. A week later he complained of a burning pain in the right iliac crest, with tenderness in that area. At the same time he complained of a persistent anterior chest pain at the level of the third left costal cartilage. These complaints persisted for about two months. During this period his heart remained large but further attempted aspirations of the pericardium did not yield any fluid, although fluid was aspirated from the left pleural cavity on several occasions. He continued to run a moderate fever and the sedimentation rate was elevated. A primary heart tumour was again suggested as the most likely condition that would explain all the findings.

At this time x-ray studies of his ilium and ribs suggested infiltrating neoplastic lesions and soon soft swellings were apparent on physical examination. Pieces of a vascular, dark red tumour were removed for histological section and a diagnosis of hæmangioendothelioma was made.

Following this denouement of the nature of the patient's illness the clinical picture continued to fulfill all the expected manifestations. Other tumours appeared in the ribs and under the spine of the right scapula. The patient developed further evidence of advancing heart failure and died with severe dyspnœa two weeks after the biopsy had been done.

Autopsy.—There were dilated veins visible deep to the skin of the anterior chest and there was marked pitting œdema of the right arm involving particularly the region from the mid portion of arm to the lower third of the forearm. There was less œdema of the left elbow region and moderate œdema of the lower extremities. There was a soft fluctuant tumour palpable over the upper sternum and manubrium. On removal of the sternum there was found to be a large defect in the bone of the upper sternum and manubrium with the area filled by a soft hæmorrhagic pinkish-grey tumour mass continuous with a mass in the mediastinum. The pericardial sac was grossly distended seeming to have filled up almost half of the thoracic cavity. Along the lateral borders of the heart, the medial border of each lung was adherent to the pericardium. There were about 500 c.c. of bloody fluid in the left pleural cavity and the left lung was almost completely collapsed. The right lung was partially collapsed and there were pleural adhesions binding its lower lobe to the lateral chest wall and to the superior surface of the diaphragm. There were obvious secondary tumours in the left third rib and right sixth rib. In these areas there was a fusiform enlargement of the rib with marked distortion and destruction of bone by soft fleshy tumour tissue with hæmorrhagic areas interspersed throughout its substance. Scattered throughout both lungs were numerous tumour nodules varying in size from about 0.5 to 1.5 cm. in diameter. The smaller tumours were pinkish-grey in colour, whereas the larger ones showed patchy areas of hæmorrhage. There was no evidence of tumour arising in the bronchi nor of metastases in the peribronchial lymph nodes.

The *pericardial cavity* was completely obliterated and in places the sac was thickened with greyish-white

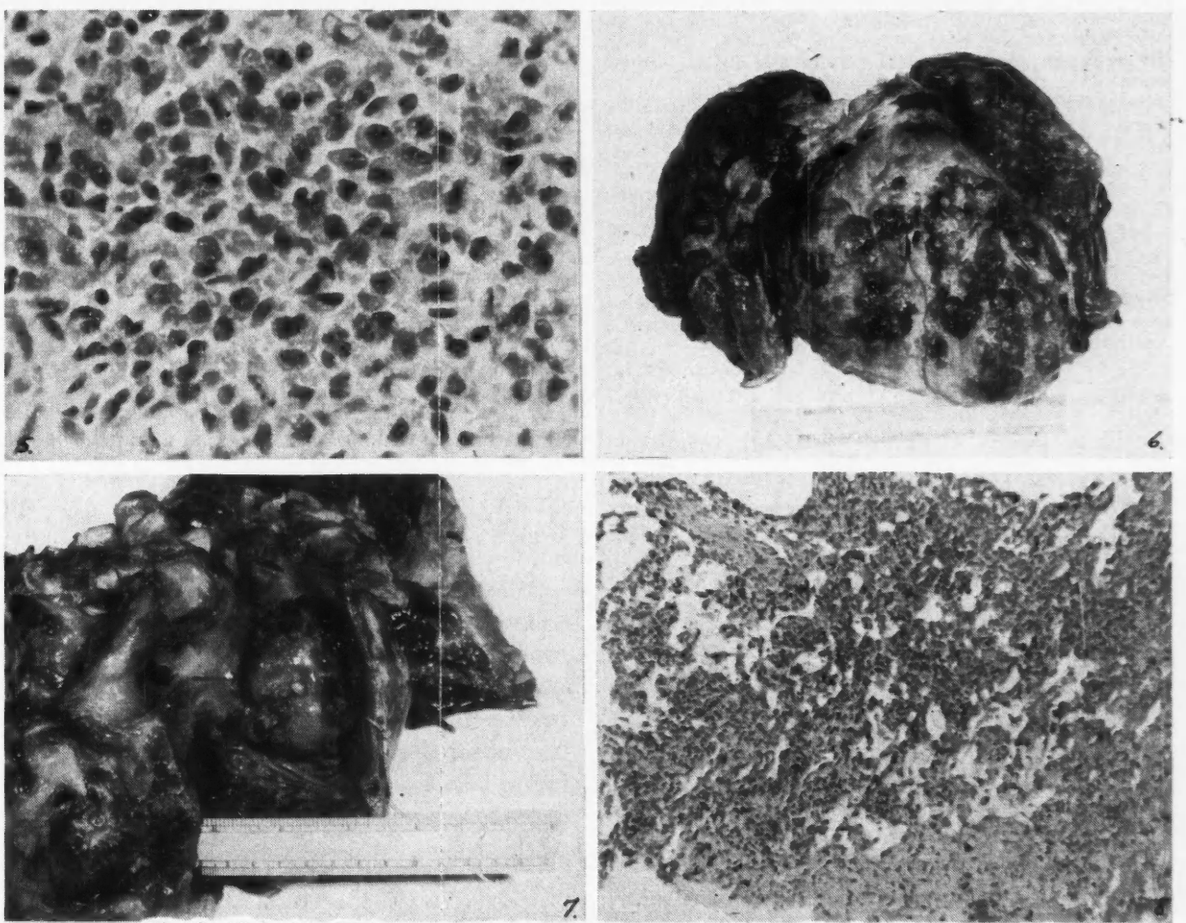


Fig. 5. (Case 1).—High power view of cellular part of tumour. Fig. 6. (Case 2).—Anterior surface of heart covered by nodules of tumour. Fig. 7. (Case 2).—Interior of right auricle showing tumour. Fig. 8. (Case 2).—Low power view of tumour showing angiomatous pattern.

tissue and generally occupied by confluent masses of tumour growth (Fig. 6). The tumour diffusely covered the surface of the heart, varying in thickness from 0.5 cm. up to 2.8 cm. The tumour tissue was pinkish-grey in colour with scattered areas of hæmorrhage and also large yellowish areas of necrosis. The superior and inferior vena cava were patent and free from invasion. The tributaries of the superior vena cava were also patent and filled with fluid blood with the exception of the subclavian and brachial veins of the right arm which were thrombosed. The right auricle of the heart was almost completely filled with a large tumour mass which measured 7 x 4 x 3 cm. in its intra-auricular portion (Fig. 7). This tumour was growing through and replacing the entire posterior wall of the right auricle and was continuous with the tumour on the pericardial surface of the heart. When this tumour was bisected, the main mass was found to measure 8 x 6 x 4 cm. There was no penetration of the inter-auricular septum and in none of the other chambers had the tumour completely penetrated through the wall. The heart and tumour mass together weighed 1,050 gm. The individual chambers of the heart were not hypertrophied. The aortic valve showed the stigmata of old rheumatic disease with fusion of the contiguous borders of the right and left cusps and this area showed a nodular thickening with calcification.

The liver weighed 1,425 gm. and measured 25 x 20 x 9 cm. and presented evidence of marked chronic passive congestion. In addition scattered irregularly throughout its substance, were multiple small metastatic tumour nodules, the greatest measuring up to about 0.8 cm. in diameter. The spleen weighed 195 gm. and measured 11 x 6 x 3 cm. It showed an increased firmness and the trabeculæ were more prominent than usual. There were no other visceral metastases. Only a few of the involved bones were examined but metastases were demonstrated in the sternum and manubrium, in the left third and right sixth ribs, the crest of the ilium and in the upper portion of the shaft of the right humerus.

Microscopic examination.—There was considerable variability in the structure of the tumour in different areas. The pattern in all of the tumours however was the same (Fig. 8). The tumour cells were endothelial in type and in the main had formed capillary-like channels and cavernous vascular spaces filled with blood. In other areas the tumour cells tend to be arranged in dense solid masses and mitotic figures were common. There were extensive areas of necrosis and hæmorrhage.

Anatomical diagnosis.—Malignant hæmangioendothelioma arising in right auricle of heart with intrapericardial spread, and metastases to lungs, liver and bones.

COMMENT

Both cases showed almost identical pathological changes. The tumour appeared to have arisen in the wall of the right auricle and to have penetrated the endocardium, giving rise to a large mass within the cavity of the right auricle, and also to have spread diffusely over the visceral pericardium. In the first case, the mass within the right auricle had produced serious secondary effects. The orifice of the superior vena cava was almost completely obstructed and although the main trunk remained patent its tributaries draining the head, neck and upper extremities were occluded by thrombosis. In both cases there was a large intrapericardial mass consisting both of tumour tissue and also serosanguinous exudate and clotted blood. The presence of this pericardial lesion as well as the partial filling of the cavity of the right auricle by the tumour had led to progressive cardiac insufficiency in both cases.

The malignant qualities of these tumours was made manifest by their infiltrative properties as well as by the presence of disseminated metastases. The histology of both tumours was generally the same, showing a variegated picture in different areas. In both, neoplastic blood vessels as well as undifferentiated masses of proliferating endothelial cells were present. Extensive areas of necrosis and hæmorrhage were widespread.

In each case, malaise and fever along with the pericardial effusion had led to an early suspicion of tuberculous pericarditis. This however was not confirmed by bacteriological study. In the second case the presence of an aortic diastolic murmur led to some confusion. This was finally resolved by the post-mortem finding of old rheumatic scarring of the aortic valve which was completely unrelated to the main pathological process.

The recognition of this rare condition during life is difficult but not impossible. The criteria suggesting that such a lesion may be present are: (1) The development of sudden heart failure for no obvious reason in a previously healthy individual (2) The presence of a bloody pericardial effusion. (3) Unexplained changes in cardiac rhythm in electrocardiograph tracings. (4) Signs of venous obstruction in the superior mediastinum. (5) The presence of secondary tumours.

In both of our cases several of these criteria were present. In the first case the proper diagnosis was not established until the post-mortem examination was made, but as a result of that study the correct diagnosis was suggested on clinical evidence in the second case and confirmed by biopsy of a metastatic lesion.

SUMMARY

Two cases of primary tumour of the heart are reported in both of which a pathological diagnosis of malignant hæmangioendothelioma was made. It is of interest that in the second case the nature of the condition was established before death. Certain clinical criteria are suggested that may serve to indicate the presence of this lesion.

REFERENCES

1. STRAUS, R. AND MERLISS, R.: *Arch. Path.*, **39**: 74, 1945.
2. HEWER, T. F. AND KEMP, R. P.: *J. Path. & Bact.*, **43**: 511, 1936.
3. WOLL, E. AND VICKERY, A. L.: *Arch. Path.* **43**: 244, 1947.

Canad. M. A. J.
Feb. 1952, vol. 66

EXPERIENCES WITH TERRAMYCIN IN URINARY AND GENITAL TRACT INFECTIONS

P. R. BLAHEY, M.D., *Montreal*

IN THE POSTOPERATIVE CONVALESCENCE of patients following major gynæcological operations variable degrees of urinary bladder complications are encountered. These complications are most frequently those of urine retention and urinary infection.

In the present study, these factors in association with operative correction for variable degrees of cystocele, urethrocele and procidentia, are analyzed in a group of 44 consecutive patients from the public service of the Montreal General Hospital.

To these patients, oral terramycin was administered in ½ gm. daily doses for one day prior to operation and 6 days postoperatively. Terramycin was selected in preference to other broad spectrum antibiotics in view of high urinary excretion rate following small oral doses of the antibiotic. In a comparative study of terramycin, aureomycin and chloromycetin by Henry I. Welsh, the urinary excretion rates were noted to be higher with terramycin both in single and multiple doses.

TABLE I.

		Pyuria	
Operation	*No.*	*Pre-op.*	*Post-op.*
Vaginal hysterectomy.....	392	21%	57%
A. and P. repair.....	100	12%	64%
Terramycin series.....	44	16%	23%

In a comparative study of the incidence of pyuria, 392 consecutive cases of vaginal hysterectomy and 100 consecutive cases of vaginal repair were reviewed from the private and public services of the Montreal General Hospital. The incidence of preoperative pyuria remained relatively constant in each group, including the treated series of 44 cases. This incidence was noted to be 21, 12, and 16% respectively. The postoperative incidence of pyuria is considerably increased to that of 57% and 64% in the control groups, whereas, the patients on terramycin therapy show a relatively small increase to that of 23%.

TABLE II.

	BLADDER FUNCTION			
Cases	*Delay voiding*	*Residual urine*	*Tidal irrigator*	*Delayed discharge*
Control (100)	49%	47%	24%	28%
Terramycin (44)	47%	50%	32%	34%

In the analysis of the bladder function there is no significant difference in the control and treated groups as is indicated by a delay in the patients' ability to void after the 6th postoperative day, or the presence of residual urine over 100 c.c. after the 8th postoperative day. The use of tidal irrigation in patients with persistent retention was relatively constant in about ¼ of patients in each group. The date of the patients' discharge from hospital is not infrequently delayed by a persistence of residual urine and here again the different groups show a uniform incidence of discharge after the 14th postoperative day. These findings are what may be expected since the above consideration deals only with the mechanical factors of bladder functions.

TABLE III.

	POSTOPERATIVE PYURIA					
	No. of times noted					
Cases	*1*	*2*	*3*	*4*	*Before 6th day*	*After 6th day*
Control (100)	15%	38%	5%	6%	43%	64%
Terramycin (44)	14%	9%	0%	0%	11%	16%

With terramycin therapy a significant decrease in postoperative pyuria was noted. In the control group of 100 patients, pyuria was present on more than one occasion in 49 patients, and was noted in only 4 patients in the group under study, or totals of 49% and 9% respectively. The presence of any postoperative pyuria before the 6th postoperative day was reduced to ¼ of the original incidence of 43%, to that of 11%. The presence of pyuria following the 6th postoperative day shows a similar reduction of the incidence from 64 to 16%.

TABLE IV.

URINE CULTURES

Organisms cultured	*Pre-op. culture*			*4 to 6 day*			*9 to 12 day*		
	H	*M*	*L*	*H*	*M*	*L*	*H*	*M*	*L*
B. coli	10	4			1	1			
B. Alk.	2	3	1					1	1
B. Aerog.	1		1				1	1	
Paracolon		2				1	1		
B. Pyocyan.					1				
Staph. Pyog.	1			5	1	1	3	3	1
B. Prot.	1	1	1	8	3	1	14		
Cases with positive culture	27			22			24		

In the series of 44 cases under study, urine culture determinations were carried out prior to operation, on the 4th to the 6th, and again on the 9th to the 12th postoperative days. In each column, H signifies a heavy growth, M a moderate growth and L a light growth of organisms in the culture. Positive cultures were obtained in a little over ½ of the patients in each series. With the exception of one culture of staphylococcus pyogenes, all the positive preoperative cultures showed bacteria of intestinal origin. The predominant organisms were *B. coli* and *B. alkaligenes.* Towards the completion of terramycin therapy which ended on the sixth postoperative day, as well as during the post therapy days, *B. proteus* and *Staph. pyogenes* were the predominant organisms. It is noted that after terramycin therapy, there were no positive cultures of *B. coli.* On two occasions where *B. proteus* organisms were cultured in the urine prior to operation, subsequent cultures failed to reveal this organism. The third positive preoperative culture of *B. proteus* remained positive with therapy. In view of the finding that the incidence of positive cultures remained at an almost constant level, whereas the incidence of pyuria was markedly reduced, it is not unlikely that the low scheduled doses of terramycin may have been only bacteriostatic to some of the organisms. The scheduled doses of terramycin were however, definitely bactericidal to most of the organisms which were cultured from the preoperative specimens of urine.

TABLE V.

COMPARATIVE MORBIDITY

	Vaginal hysterectomy		*Vaginal repair*	
	Control	*Terramycin*	*Control*	*Terramycin*
Cases	392	21	100	23
Morbidity	47%	33%	21%	22%
Penicillin	17%	9%	30%	8%
Sulpha	66%	0%	47%	4%

In a comparative study of morbidity in each of the control and treated groups, the incidence was reduced slightly in the vaginal hysterectomy groups from 47 to 33%, whereas the comparative incidence in the vaginal repair groups remained unchanged at 21 and 22%. Penicillin was used in 17 and 30% in each of the control groups, whereas in the treated groups the incidence was 9 and 8% respectively. In the latter 4 cases where penicillin was used, the morbidity was due to complications not associated with the genito urinary tract. Oral sulfonamides were used in 66 to 47% respectively in the control groups. Only one patient was prescribed oral sulfonamide in the treated group in the treatment of cystitis which followed three days after the cessation of terramycin therapy.

In the analysis of the causes of morbidity in the twelve patients, it was noted that with the possible exception of one case, urinary bladder infection was not an etiological factor. Four patients in close succession developed diarrhœa from the 5th to the 7th postoperative days. This was associated with febrile reaction. In two patients, terramycin therapy was stopped, in one it was continued, and in the remaining one the dose of terramycin was increased to 2 gm. daily. All responded satisfacoritly and equally well. There were four patients who were morbid where the etiological factor must be attributed to pelvic causes, but only in one was the factor apparent. This patient had an infection of the posterior vaginal repair with separation of the suture line in the perineum and a purulent discharge. This patient had diabetes mellitus. The remaining four patients, who otherwise recovered uneventfully, had pulmonary collapse, bronchopneumonia, parotitis, and a severe postoperative spinal headache.

At the time of the patients' discharge from hospital, a careful examination of wound healing was noted. In 14 patients, wound healing was not complete. Nine of these showed small areas of granulation. In this latter group, 2 patients had diabetes mellitus. There were three patients who showed wound separation and two patients had wound infection. In this group of five patients there were four patients who had diabetes mellitus.

A variety of other genito-urinary complications not included in the comparative study were also treated with terramycin. The dose schedule was not altered for urinary infections, whereas all others received from 1.5 gm. to 2.5 gm. daily for variable periods of time. The response was very satisfactory in conditions treated to date, with the exception of cellulitis in association with radiation therapy of cervical carcinoma and in progressive disease in cervical carcinoma which was associated with pyrexia. Two patients in each of the above groups failed to show any clinical response to terramycin therapy.

In seven patients a diagnosis of ante-partum cystitis and pyelitis was determined on the basis of clinical findings and urinalysis. No specific instructions were given to these patients other than terramycin therapy, which was administered in ½ gm. to 1 gm. daily doses with a total dose of 4.0 gm. The response was uniformly good with complete relief of symptoms within 24 hours and absence of pyuria by the second and third days of therapy. Patients with pyelitis were well and doing their usual duties within 24 hours of initiation of treatment. Two patients with cystitis were treated while at work without any loss of time from their usual employment. There has been one recurrence of cystitis which occurred 5 weeks after the initial therapy. On two occasions, infective cystitis in association with radiation therapy was completely cleared. In one patient, pyonephrosis associated with a calculus in one renal pelvis responded satisfactorily to terramycin therapy, after failure with penicillin and streptomycin. The organism cultured was a strain of *B. coli,* which was found to be resistant to streptomycin and sensitive to terramycin by laboratory determination.

Septic abortion was treated satisfactorily in three instances. Post partum mastitis in three patients showed a very good response to terramycin therapy with a total dose of 4.0 gm. In each instance there was complete resolution of the infection without recurrence. A large pelvic abscess which did not respond to penicillin and streptomycin therapy showed a satisfactory resolution of the symptoms on terramycin therapy. At the time of a subsequent surgical procedure, a positive culture of *B. coli* was obtained from the abscess. The strains of *B. coli* were resistant to streptomycin but sensitive to terramycin. One patient on the Urological Service is included in this series. She had persistent recurrences of high fever for a period of 34 days. The source of infection was suspected in the region of one kidney, but the exact nature of the lesion could not be determined. She was given penicillin, streptomycin, aureomycin, and chloromycetin in succession without adequate response. With terramycin therapy the response was satisfactory. At the time of a surgical draining of a renal carbuncle, *Staph. pyogenes* was obtained from the culture. This strain was resistant to penicillin, streptomycin, aureomycin, and chloromycetin but was sensitive to terramycin.

A severe form of peritonitis in one patient was treated with oral terramycin. She was hospitalized for investigation of hæmaturia subsequent to radiation therapy with an apparent arrest of cervical carcinoma. Following a cystoscopic examination she developed a severe peritonitis which did not respond to penicillin, streptomycin therapy but showed some response to terramycin. At the time of a surgical intervention *B. pyogenes* was cultured from the peritoneal cavity. This organism was found to be resistant to streptomycin, chloromycetin, and bacitracin, but was sensitive to terramycin. This patient has recovered very satisfactorily with progressive resolution of a mass which filled the pelvis and lower abdomen to the level of the umbilicus.

A total of 67 patients were treated with variable doses of terramycin. Seven patients had symptoms which were attributed to the antibiotic. Three patients had nausea, two had nausea with some diarrhœa, and the remaining two had diarrhœa alone. In no instance were the manifestations of any concern and the response in each instance was satisfactory with the cessation of therapy.

CONCLUSIONS

1. Prophylactic terramycin therapy: (a) does not reduce urine retention; (b) reduces pyuria markedly; (c) reduces pyuria associated with retention.

A comparable series with prophylactic sulfonamide did not show any beneficial effect on postoperative pyuria.

2. Terramycin has profound action upon intestinal bacteria, excluding *B. proteus.*

3. Terramycin does not appear to benefit poor wound healing in diabetic patients.

Canad. M. A. J.
Feb. 1952, vol. 66

4. Morbidity from apparent genito-urinary causes was noted in only one patient of 44 patients who received prophylactic terramycin.

5. No untoward complications were encountered.

I wish to express gratitude to Dr. A. Pritchard and his staff at the Montreal General Hospital for their work in cultural studies and the Pfizer Corporation for supplying the terramycin.

BIBLIOGRAPHY

1. WELCH, H.: *Ann. New York Acad. Sc.*, **53**: 253, 1950.

ANÆSTHESIA FOR FENESTRATION‡

M. B. SHEA, M.D.* and
B. W. TANTON, M.D.,† *Vancouver, B.C.*

FENESTRATION is an operation for the relief of deafness caused by clinical otosclerosis. The condition is manifested pathologically by the fixation of the stapes, which prevents the transmission of sound waves to a normal labyrinth.

As far back as 1649 Rolarius performed myringotomies for the relief of deafness. From 1920-24 Holmgren of Stockholm and Sourdille of Nantes, who seemed to be approaching a solution to the problem, attracted attention. Sourdille published a description of a fenestration operation done in three stages, but his results were transitory. It was not until 1938 that J. Lempert described a one-stage operation. Later, in the same year, G. E. Shambaugh Jr. presented his method. In 1941 Lempert described his present technique known as the "Fenestra Nov-ovalis Operation". Since 1937 from twenty to twenty-five thousand fenestrations have been performed by otologists.

Fenestration may be considered a specialty within a specialty. The surgical procedure is one of the most delicate undertaken today. For this reason, the anæsthetic requirements are just as individualized.

In fenestrations, as in all surgery, conditions must be safe and comfortable for the patient and the requirements of the surgeon must be met to produce accurate results. Therefore, there are many features to consider. The use of the electrocoagulation unit and the dental drill prohibit the use of inflammable agents. An absolutely still patient and a bloodless operating field are prime requisites. The plane of anæsthesia may be light except during: the elevation and shaping of the sensitive skin flap; the removal of the mastoid cells, where the disturbing factor is noise; the making of the fenestra and the opening into the labyrinth. The latter often causes nausea, vomiting or vertigo. Bleeding is venous in character and the most difficult hurdle to overcome. If excessive, it increases the operating time. Blood may extend into the bony labyrinth at the time of the making of the new oval window, and either nullify the value of the operation or produce a very disturbing labyrinthitis. Trauma produced by suction, or other mechanical means for removal of blood, may result in damage to the facial nerve, ear drum or delicate skin flap.

Multiple techniques and agents have been used in an attempt to accomplish all the aforementioned requirements.

Lempert[1] still uses profound sedation with local anæsthesia, maintaining that any type of general anæsthetic increases bleeding. However, in one paper[2] he painstakingly describes means of preventing and dealing with bleeding. In their articles such men as Day,[3] Goodyear,[4] DeWeese,[5] Rosen,[6] Kinney,[7] Ersner and Myers[8] and Campbell,[9] all state that they employ the method of Lempert with slight variations in the basal narcosis. Shambaugh,[10, 11, 12] after attempting the procedure under avertin, has returned to local anæsthesia as used by Lempert. Simson Hall[13, 14] has tried ether, cyclopropane and avertin. Hall and Millar[15] described a method of reducing the blood pressure by means of a high spinal anæsthetic combined with intubation and fractional doses of pentothal sodium.

General anæsthesia is employed by Kend[16] but the particular method is not mentioned. Hutchinson[17] states that he prefers "gas", oxygen and trilene. Henderson[18] has his patients intubated and the anæsthesia maintained with trilene. Garnett Passe[19] advocates massive doses of premedication followed by intravenous pentothal sodium. Hershey and Jones[20] reported on their use of fairly intense premedication followed by rectal avertin, nitrous oxide and intravenous morphine. The nitrous oxide is administered through a Connell face piece by a to-and-fro method. Harris and Hale[21] have described induced hypotension by arterial bleeding to produce a bloodless operating field. House[22] uses deep basal narcosis supplemented by pentothal sodium and continuous oxygen. Johnson and Silva[23] give their patients large doses of premedication, topical pontocaine to the pharynx, intravenous nembutal and 0.4% pentothal sodium together with oxygen. A Guedel oropharyngeal airway is used. Kohlmoos[24] describes the use of initial narcosis with pentothal sodium, local, insufflation of nitrous oxide, an oral airway and intermittent intravenous demerol.

Extensive investigations have been made to discover a drug which would lower blood pressure and yet be harmless to the patient. Gough[25] has had very satisfactory results with pentamethonium bromide and posturing as a medium for reducing bleeding.

*From the Department of Anæsthesiology, Vancouver General Hospital.
†From the Department of Otolaryngology, Vancouver General Hospital.
‡Read before the Canadian Anæsthetists Society, Murray Bay, June 27, 1951.

It must be remembered that the majority of the above mentioned are otologists who probably are working in co-operation with anæsthesiologists.

I will now report on our experiences with over 100 fenestrations in the Vancouver General Hospital. This series of cases ranges in ages from 15 to 56 years, females predominating over males 3 to 1, with operating times varying from 1 to 5 hours. Prior to the first fenestration in November, 1946, Lempert's local procedure was tested on two endaural mastoidectomies. In our hands, however, the patients were too disturbed and operative conditions impossible. From this time forward we resorted to general anæsthesia.

Our first fenestration under general anæsthesia was an ethyl chloride induction with an orotracheal ether insufflation maintenance. Premedication was morphine and atropine. This technique too, although an improvement, was still unsatisfactory. Since this time all patients have been intubated. The premedication has evolved from the above, through morphine and hyoscine, down to the present sodium seconal, demerol and hyoscine. Pentothal sodium, in various concentrations, both continuous drip and fractional, with or without curare, has been tried. Respiration has been spontaneous, assisted and controlled. Eventually there was evolved the present technique which is as follows:

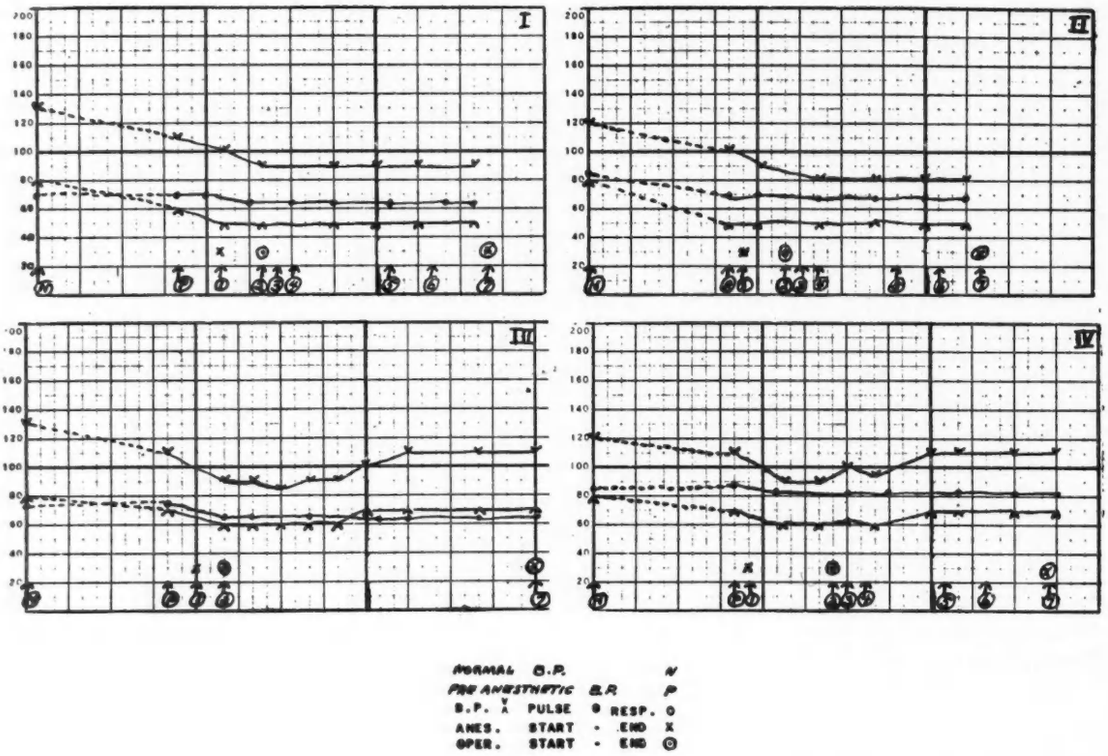
Each patient is interviewed, reassured and estimated on the evening prior to operation and a sedative is ordered to ensure a night of refreshing sleep. One and one-half hours prior to operation he is given sodium seconal grains 1½ to 3 orally, followed one-half hour later by demerol mgm. 100 and hyoscine grains 1/150 to 1/100 hypodermically. These doses are gauged for each person so that he will be comfortably drowsy and his blood pressure will be considerably lowered. The oropharynx is then sprayed with 2% pontocaine. Care is taken to anæsthetize the superior laryngeal nerves, the sensory innervation of the vocal cords, as they cross the piriform fossæ. When possible, the cords are sprayed and the agent encouraged to pass through them to the trachea and carina. This helps to prevent coughing and straining, which are common causes of venous congestion in the head. Oxygen is administered, by face mask, between sprayings. The large volume of oxygen tends to replace the nitrogen in the lungs and guard against any hypoxia should there be delay in intubation. Hypoxia leads to increased bleeding. Next, an intravenous of demerol mgm. 200 in 500 c.c. of normal saline is started. The patient is then given a mixture of 0.37 to 0.5 gm. of 2½% pentothal sodium and 3 to 5 c.c. of syncurine intravenously and is intubated with Magill tube of suitable size. Controlled respiration is immediately started with a high flow of nitrous oxide and oxygen to blow off the carbon dioxide in the lungs. This removes any tendency, on the part of the patient, to breathe, even under light anæsthesia. Usually the flow is about 3 litres of nitrous oxide and 1 litre of oxygen per minute. If there are any signs of oxygen lack, the oxygen flow is increased to 2 litres. By controlling the respiration, it has been found that less of the intravenous medication is required and the depth of anæsthesia more readily estimated by the resistance to the bag pressure. In positioning the patient, care is taken not to flex the head on the shoulders to such an extent that the jugular veins are compressed, as this also produces congestion in the operating site. A 5 to 10 degree reverse Trendelenburg position is used, in the hope of removing a little more blood from the head and also further lowering of blood pressure. Pulse and blood pressure are carefully watched and maintained below normal. At the end of operation, if respiration is not resumed spontaneously or the patient appears unduly depressed, intravenous coramine is given. This, however, is an infrequent occurrence.

All patients are sent, on their own beds, to a recovery room where they remain until fully conscious under the immediate supervision of specially trained nurses. Here all facilities for oxygen therapy or tracheobronchial toilet are readily available.

Figs. I, II, III and IV demonstrate the course of four representative cases of fenestration. It may be noted that blood pressure has been lowered by both premedication and induction and maintained at a low level throughout the course of anæsthesia.

Steps in the procedure are noted in each figure as:

1. Patient is induced with pentothal sodium plus syncurine.
2. Skin incision is made after local infiltration with procaine and adrenalin. This is not painful because of local anæsthesia.
3. The skin flap is elevated from the wall of the auditory canal. Deep anæsthesia is required at this point as the local does not reach this area.
4. Removal of the mastoid cortex is started. This is not painful but the noise from the dental drill is a distressing factor and deeper anæsthesia is required.



5. Shaping and trimming of the skin flap is commenced. Here also deep anæsthesia is necessary, as this is a painful procedure.
6. Fenestration is started. This is not painful but is apt to cause nausea and vomiting when the labyrinth is opened and an absolutely still patient is essential.
7. Operation is finished and when necessary a tracheobronchial toilet is performed.

All four cases were given sodium seconal gr. 1½ orally one and one-half hours preoperatively, together with demerol mgm. 100 plus hyoscine hydrobromide gr. 1/150 one hour preoperatively by subcutaneous injection.

SUMMARY

Surgical procedures for the correction of deafness were attempted as far back as 1649. The fenestration operation most frequently performed today was first described by Lempert in 1941.

Conditions should be comfortable for the patient and the surgical requirements, of a motionless and bloodless field, met.

The anæsthetics used by various otologists in Great Britain, the United States and Canada have been reviewed. Many local and general anæsthetics are employed.

The methods and agents used in the first 100 cases of fenestration at the Vancouver General Hospital included ether insufflation, as well as pentothal sodium, continuous drip and fractional, with or without curare or demerol.

The anæsthetic most frequently used today has been described in detail but is basically: premedication with sodium seconal, demerol and hyoscine; topical pontocaine to the oropharynx; endotracheal intubation; intravenous 0.4% demerol continuous drip; nitrous oxide and oxygen administered by a semi-closed circle absorption technique with controlled respiration.

REFERENCES

1. LEMPERT, J.: *Arch. Otolaryng.*, **28**: 42, 1938.
2. *Idem*: *Arch. Otolaryng.*, **31**: 711, 1940.
3. DAY, K. M.: *Arch. Otolaryng.*, **46**: 534, 1947.
4. GOODYEAR, H. M.: *Arch. Otolaryng.*, **31**: 451, 1940.
5. DEWEESE, D. D.: *Portland Clin. Bull.*, **1**: 3, 1947.
6. ROSEN, S.: *J. Mount Sinai Hosp.*, **14**: 98, 1947.
7. KINNEY, C. E.: *Tr. Am. Laryng., Rhin. & Otol. Soc., Inc.*, p. 171, 1945.
8. ERSNER, M. S. AND MYERS, D.: *Ann. Otol., Rhin. & Laryng.*, **50**: 206, 1941.
9. CAMPBELL, E. H.: *Arch. Otolaryng.*, **30**: 689, 1939.
10. SHAMBAUGH, G. E. JR.: *J. A. M. A.*, **119**: 243, 1942.
11. *Idem*: *Arch. Otolaryng.*, **43**: 549, 1946.
12. *Idem*: *Illinois M. J.*, **81**: 104, 1942.
13. HALL, I. S.: *Proc. Roy. Soc. Med.*, **37**: 737, 1944.
14. *Idem*: *Brit. M. J.*, **2**: 647, 1946.
15. HALL, I. S. AND MILLAR, A. MACC.: *J. Laryng. & Otol.*, **64**: 233, 1950.
16. KEND, L.: *Laryngoscope*, **51**: 37, 1941.
17. HUTCHINSON, C. A.: *Proc. Roy. Soc. Med.*, **37**: 737, 1944.
18. HENDERSON, G. I.: *Proc. Roy. Soc. Med.*, **37**: 737, 1944.
19. PASSE, E. R. G.: *Lancet*, **1**: 171, 1947.
20. HERSHEY, S. G. AND JONES, M. F.: *Arch. Otolaryng.*, **46**: 390, 1947.
21. HARRIS, H. E. AND HALE, D. E.: *Cleveland Clin. Quart.*, **14**: 159, 1947.
22. HOUSE, H. P.: *Ann. Otol., Rhin. & Laryng.*, **57**: 41, 1948.
23. JOHNSON, L. F. AND SILVA, H.: *New England J. Med.*, **240**: 718, 1949.
24. KOHLMOOS, H. W.: *Stanford M. Bull.*, **8**: 53, 1950.
25. HUGHES, G.: *Lancet*, **1**: 666, 1951.

SACRO-ILIAC JOINTS*

Observations on the Gross and Histological Changes in the Various Age Groups

G. R. MACDONALD, B.Sc., M.D.† and
T. E. HUNT, B.A., M.D.,‡ *Toronto*

COLLINS[1] in a discussion of the pathological alteration in the sacro-iliac joints during the course of ankylosing spondylitis (Marie Strumpel type), states: "There appear to be no histological reports on these joints". This is true, in spite of the recent increase of interest in the radiological changes in these structures associated with this disease. Indeed, there is little information available concerning the normal variations in these joints during life.[2]

This paucity of information may perhaps be excused for two reasons. Firstly, the articular portions of the sacro-iliac joints are inaccessible for biopsy purposes, and few patients with spondylitis die of the disease—at least in the early phases. Secondly, even at post-mortem the complete removal of the joints has been considered to be a formidable and rather mutilating procedure, unwelcomed in most hospital laboratories. Thus, fresh material for study has been generally unavailable.

The challenge of this state of affairs has resulted in an attempt to obtain satisfactory fresh specimens from one or both sacro-iliac joints during routine post-mortem examination. It became possible to carry out an investigation of the so-called "normal variations" in the different ages; thus providing a fitting background for the study of pathological changes should such be presented.

The purpose of this paper is to present our observations of the gross and histological appearances of the sacro-iliac joints in the various age groups. Included as well is a description of the method which has been found to be quite satisfactory for obtaining specimens. It should be emphasized that this report deals only with the true, diarthrodial portions of the joints.

*From the Department of Pathology and the Department of Medicine, Arthritis Service, Sunnybrook Hospital, D.V.A., Toronto, Ont.

†Assistant Resident in Pathology, Sunnybrook Hospital, D.V.A., Toronto, Ont.

‡Canadian Arthritis and Rheumatism Society Fellow in Medicine, Sunnybrook Hospital, D.V.A., Toronto, Ont.

MATERIAL

The material for this study was obtained from 57 unselected post-mortem examinations carried out on males at Sunnybrook Veterans' Hospital, Toronto, Canada. Two further specimens were made available to us through the kind co-operation of Dr. W. L. Donohue and his staff in the Department of Pathology at the Hospital for Sick Children, Toronto. For study purposes, the specimens were grouped according to the ages of the cases, as shown in Table I, below. It will be noted that the majority of these specimens have been obtained from patients in the older age group. This is because cases coming to post-mortem at this hospital are generally advanced in years. Being a veterans' hospital too, there have been few cases in the age group between 40 to 49 years. Only three of the cases were known to have been treated primarily in hospital for arthritis. Two of these had well established severe rheumatoid arthritis, and one had far advanced ankylosing spondylitis with peripheral joint involvement.

The diagnoses in the remaining cases varied greatly as would be expected. A search of their hospital records was carried out after the anatomical observations were made, and any musculo-skeletal complaints recorded. In eight, there were clinical records of osteo-arthritis involving either the spine or hip joints, and in four of these advanced degenerative changes were found in the sacro-iliac joints. Six additional patients were noted to have had x-ray evidence of degenerative joint disease, but there was no correlation between this observation and the changes seen in the joints under study. One other patient's x-rays demonstrated obliteration of the sacro-iliac joints, although, there were no musculo-skeletal complaints. The specimens from this case confirmed the radiological diagnosis. The histories of the remaining 44 cases were non-contributory.

METHOD

Specimens were obtained during routine autopsy procedures. After clearing away the psoas muscle and other soft tissues overlying the alæ of the sacrum and the ilium, the antero-inferior margins of a sacro-iliac joint were easily demonstrated. A sharp chisel was then driven into the bones on either side of the joint for distances of 5 to 6 centimetres. After making parallel cuts of 5 to 8 centimetres in length, in such a manner, a narrow chisel was finally driven from the upper margins of the sacro-iliac articulations, downwards and backwards into the pelvis. The block so produced included the complete diarthrodial joint or the major part of it, as well as some of the adjacent bone. Left behind was only ligamentous

Canad. M. A. J.
Feb. 1952, vol. 66

TABLE I.

Group	*Age*	*Number of cases*
I.	*Newborn	2
II.	20 - 29 years	7
III.	30 - 39 "	7
IV.	40 - 49 "	2
V.	50 - 59 "	10
VI.	60 - 69 "	10
VII.	70 and over	21
	Total	59

* Specimens from the Hospital for Sick Children, Toronto.

portion, but this was sufficient to prevent mutilation. With experience, the whole procedure was accomplished in 5 to 10 minutes.

The gross specimens were first tested for joint stability. Following this any ligamentous portions, if present, were dissected with scalpel or scissors. A sufficient amount of the capsule was then incised so that the joints could be laid open from the posterior aspects, unless there was fusion between the articular surfaces. Both articular cartilaginous surfaces were then inspected as well as significant portions of the capsule and synovial tissues. Examination of the fused specimens had to be carried out primarily on cross sections made perpendicular to the planes of the joints. After microscopic sections were taken, gentle prying with a blunt instrument was found to be sufficient to open the remainder of the joint in most instances. Only two were fused to such an extent that separation was not possible. Representative portions of each specimen were placed in a variety of fixatives. Formalin was found to be the most satisfactory.

Histological sections were prepared from characteristic specimens in each age group, and from every case in which the joint appeared to be fused. A jeweller's saw was found invaluable for procuring blocks thin enough for satisfactory decalcification without tearing off the capsules or synovial tissues. In the case of formalin fixed specimens, a period of dehydration in alcohol, prior to decalcification, was found to be necessary. The method of rapid decalcification with nitric acid was used. In a few instances, decalcification was attempted with electrolysis as well as by the ion exchange resin method.[3] Neither proved to have any significant advantage over the nitric acid method. After decalcification, paraffin block sections were prepared and stained with hæmatoxylin and eosin in the usual manner.

OBSERVATIONS

(a) *General anatomical features.*—The joints were found to be roughly crescentic in shape with the curved edges pointing anteriorly and inferiorly. The sacral articular surfaces were found to be somewhat convex while those on the iliac side were slightly concave. This study confirmed the presence of a true synovial diarthrodial joint composed of articulating cartilage together with an enveloping synovial membrane, and anteriorly at least, a fibrous capsule. Capsular tissues were not identified either in the gross or histological preparations between the articular and fibrous portions of the joint, although synovial tissues were present in this region.

Except in early infancy, all of the joints were extremely stable. No significant movements were produced even with pressure of a bench vise, apart from very slight degrees of compression. It will be recalled that occasionally only a portion of the ligamentous union was present in each specimen after removal from the body. With such stability, it would seem very unlikely that any significant degree of subluxation could occur in the sacro-iliac joints of adult males. Indeed, in a suicidal case who had jumped from a fifth storey, both alæ of the sacrum were fractured but the sacro-iliac joints were intact. After removal they only permitted a millimetre of sliding motion. This case was seventy years of age and fusion of the joint spaces was not demonstrated. Sashin[2] has reported greater mobility in females during pregnancy and in the puerperium. A similar degree of mobility was noted in our newborn cases, where sliding and rotatory movements, ranging through several millimetres, were demonstrated even in the presence of complete ligamentous union posteriorly.

The cartilaginous surfaces were of interest, in that the sacral cartilage was found to be consistently two to three times the thickness of that on the iliac side. This relationship persisted in spite of advanced degenerative changes in some of the older cases. In the younger ages, the surfaces generally were found to be smooth and shiny without interlocking ridges, although these features did become evident in the older age groups. The fine radiating lines on the iliac cartilage, described in many texts,[4] were evident in adults up to about middle age. Fusion of the cartilaginous surfaces was apparent in eleven cases over 50 years of age. These will be discussed in detail separately.

(b) *The changes occurring in the various age groups*:

1. *In early infancy.*—In the newborn, as noted above, the sacro-iliac joints were found to have considerable mobility. On gross examination, a thin capsule and a very fine membrane-like synovium was recognized along the antero-inferior margins. The cartilaginous surfaces were smooth, shiny and of a pearly-blue colour. No lines, ridges or pitting were evident (Fig. 1). There was little subchondral bone, and that present could be easily cut with scissors or a scalpel.

Microscopically, the capsule although thin was seen to be composed of well-formed, quite cellular, collagenous connective tissue. A moderate number of fibroblasts were present, as were small, thin-walled blood vessels. The synovial tissues consisted of loose areolar connective tissue with an intimal layer three to four cells in thickness. There was a moderate number of small blood vessels scattered throughout the areolar tissue, and in this region metachromasia to toluidine blue dye was demonstrated. In both specimens, small, vascular villi protruded into the joint spaces. The intimal layers (stratum synoviale) of the synovium were continuous on both sides with a single layer of elongated cells, which completely covered the cartilagious surfaces. These surfaces were smooth and regular. The cartilage *per se* presented no abnormality, and, particularly on the iliac side, demonstrated the characteristic transition of cartilage into new bone (Fig. 2).

2. *20 to 29 years.*—In this group, the capsules were quite thin and pliable, but the areolar-like membranous synovial tissues were identified much more easily. The joint spaces were clear. No debris was present on either cartilaginous surface. The cartilage, generally, was not as smooth or as shiny as in the infant, and was of a greyish-yellow colour. A few minute depressions were scattered over both the iliac and the sacral surfaces. The cartilages on the sacral side measured 2 to 3 mm. in thickness, while those on the iliac averaged 1.5 mm. The subchondral bone was dense, but did not appear to be sclerosed.

Microscopically, the capsules were found to be composed of a fairly dense, relatively acellular and avascular collagen, which merged gradually into the periosteum at the joint margins. The synovial tissues were also relatively thicker than in the newborn, and much more fibrous in composition. A decrease in the vascularity was also evident. The cartilaginous surfaces were slightly irregular, and only broken portions of the flattened, superficial layer of elongated cells were seen. The usual distinct zone of calcification separated cartilage and subchondral bone. This line was continued with a similar zone of calcification just deep to the periosteum. No abnormalities of subchondral bone and bony cortex were seen.

3. *30 to 39 years.*—Generally, the gross features of this group were similar to those observed in the previous age group. Although the cartilaginous surfaces were still quite smooth, there was a slight increase in the number of the minute depressions, particularly on the iliac side.

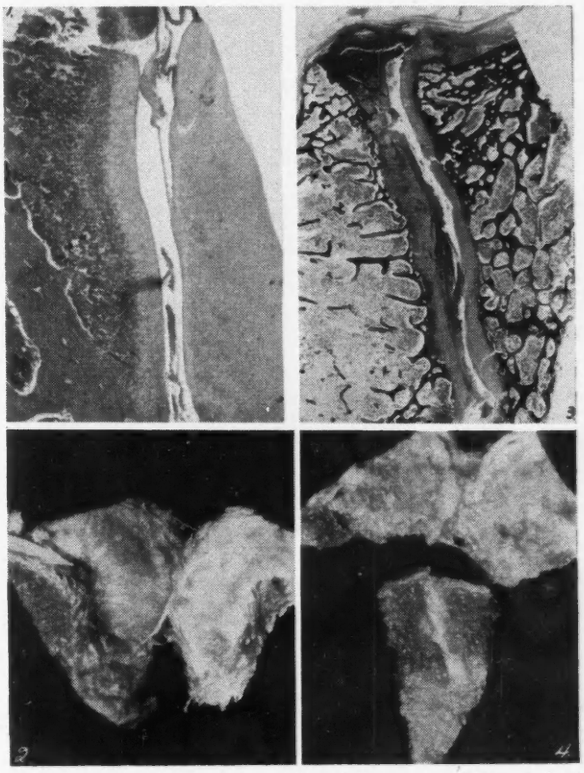


Fig. 1.—Section of the joint from a newborn infant showing from above down (a) the thin capsule; (b) a tongue of synovium; (c) the wide joint space. The articulating cartilage on the left (sacral side) shows the normal transition of cartilage to bone. **Fig. 2.**—Sacro-iliac joint of a male of 70 years of age showing erosion and pitting of cartilage. **Fig. 3.**—Section of joint shown in Fig. 2 showing (a) thick capsule; (b) fibrillation and destruction of cartilage; (c) thin subchondral bone. **Fig. 4.**—Sacro-iliac joint showing articular surfaces. There is marked destruction of the cartilage and large amounts of amorphous debris in the joint space causing a superficial type of fusion.

Histologically, the capsules appeared to be somewhat thicker and there was an increase in the amount of fibrous material in the synovial tissues. The latter were much less vascular than previously, and the intimæ were composed of only one or two cellular layers. The layer of elongated cells, on the cartilaginous surfaces, could not be identified, and there was some roughening and minimal erosion of the superficial cartilage. A slight amount of fibrillation was seen in the marginal layers, but the deeper cartilage did not appear unusual. No abnormalities were noted in bone or periosteum.

4. *40 to 49 years.*—In this group degenerative changes became apparent upon gross examination. These consisted mainly of superficial irregularities and erosions in the cartilaginous surfaces with collections of flaky, yellow, amorphous debris. In both specimens, the iliac cartilage appeared to be affected more than that

on the sacral side, and the fine radiating lines were difficult to identify. The gross and microscopic appearances of the capsular and synovial tissues were similar to those of the younger adult age group.

Histologically, the surface layers of the cartilage were found to be quite irregular, with considerable fibrillation and erosion. In some of the eroded areas, there were collections of eosinophilic, acellular, amorphous material. On the iliac side, the cartilage cells and lacunæ tended to collect into cellular islands, the intervening matrix being bland, eosinophilic and somewhat fibrillated. In contrast, the sacral cartilage maintained a normal hyaline appearance, deep to the eroded regions.

5. *50 to 59 years.*—Thickening of the capsule and synovial tissues was evident in this age group, and there were more extensive degenerative changes in the articulating cartilage. In one case, the joint space appeared to be obliterated, although, there did not seem to be any decrease in the thickness of the cartilage. (X-rays of the joint taken at post-mortem revealed no obvious abnormalities.) After blocks were taken for microscopic section, the opposing edges could be separated easily by gentle prying with a blunt instrument. The cartilaginous surfaces thus exposed did not appear to be remarkably different from the others in this age group. In another, the joint spaces were completely obliterated, the cartilage irregular, and in several regions there was complete bony bridging. This will be described with fused specimens.

Microscopic examination of the other joints confirmed the thickening of the capsule and synovial tissues, and in addition, there was extensive loss of cartilage on the iliac side of the joint with gross irregularities of the surface layers. The sacral cartilage was somewhat irregular and showed fibrillation and superficial erosion, but the changes were not so marked as on the opposing side.

6. *60 to 69 years.*—The sacro-iliac joints were found to be fused in two of the ten cases studied. These will be described separately with the other joints which demonstrated this condition. Thickening of both the capsule and synovium was noted in a third of the remaining specimens. The cartilage showed further irregularities with erosion of larger areas, up to 4 or 5 mm. in diameter. In some of these larger eroded areas, the articulating surfaces were almost completely denuded of cartilage. The yellowish, amorphous plaques observed in the previous age groups were much more abundant and covered almost the entire superficial layer on each side. Definite ridging was observed near the anterior margins in two cases, while in another, early lipping could be observed in the sub-capsular regions. The sacral cartilage, apart from the eroded areas, maintained a thickness of 2 to 3 mm. There appeared, however, to be a generalized narrowing of the cartilage on the iliac side of the joints, the average being less than .1 mm. in thickness. Again, the erosions were more prominent on this side, and the usual radiating lines were not identified. Moderate subchondral bony sclerosis was noted in the gross in only one case.

The microscopic examination confirmed the presence of capsular thickening in three cases, and in these there was a slight amount of calcification of the capsular attachments on either side of the joint spaces. In two specimens, there was increased density and vascularity of the synovial tissues with focal accumulations of fibroblasts and small, round cells. The capsules and synovia of the other joints resembled those of the previous groups.

In all cases, there were gross irregularities in the superficial layers of cartilage, with fibrillation extending into the deeper portions. In some areas erosion had occurred almost to the surface of the bone, and the thin layer of remaining cartilage was acellular and necrotic in appearance. Amorphous, acellular, eosinophilic material covered large areas on both surfaces. In one case, the cartilage was completely destroyed immediately deep to the capsule on the anterior aspect of the joint and it appeared to have been replaced by loose, rather vascular, connective tissues. Early subcapsular osteophyte formation with moderate subchondral bony thickening was seen in two cases.

7. *Over 70 years.*—Six of the twenty-one specimens in this age group were fused. In one case, the patient had been known to have had Marie Strumpel's spondylitis for many years, while another had had typical rheumatoid arthritis of over twenty-five years' duration. Ante-mortem x-rays of the former case revealed obliteration of the sacro-iliac joints. Radiological studies of the spine of the patient who had had rheumatoid arthritis were normal. These together with the other four fused specimens will be described along with the others showing this abnormality in a separate section.

The remaining fifteen specimens presented marked degenerative changes with extensive erosion of cartilage and thickening of both capsular and synovial tissues. In all cases there was definite and sometimes marked marginal lipping. Some of the articular surfaces were extremely roughened due to the presence of large areas of erosion and apparently sloughing of necrotic cartilage. In between the eroded areas, there were apparent elevations particularly on the sacral surface. It was felt that these represented less affected cartilage rather than hyperplasia of hyaline cartilage. The thickness of the cartilage on the sacral side as well as that on the iliac was greatly diminished, averaging 1.5 mm. and 0.5 mm. respectively. The subchondral bone appeared to be atrophic (Fig. 3).

The cartilaginous changes were the most remarkable features of the histological observations. The capsule and synovium, although dense and thickened, did not appear to be significantly different to those of the previous two age groups. All sections examined, however, demonstrated marked fibrillation of cartilage with necrosis and breaking off of superficial and deeper layers. The cells in the remaining cartilage were all collected into islands, with fibrillated, eosinophilic, whorled, intervening ground substance. In the subcapsular regions, osteophyte formation was seen in all cases, and in some was quite striking. The subchondral bone was generally much thinner than normal and the bone cortex appeared to be decreased (Fig. 4).

8. *Fused specimens.*—Four different types of fusion were found among the eleven specimens presenting this feature.

In the first group, the opposing articular surfaces were united by a mass of yellowish, amorphous material which was similar both grossly and histologically to that covering the cartilage in the older cases. This fusion would appear to have occurred merely as a result of adhesion of necrotic superficial debris on to both cartilaginous surfaces. This union was broken easily and the two sides then separated without difficulty. After separation, gross and histological studies of the four cases in this group revealed no significant alterations, other than those described in non-fused specimens from the same age groups (Figs. 5 and 6).

The second group, comprising two specimens presented similar gross and histological features to those described above, except that the zone of calcification was less prominent. In addition, however, extensive areas of cartilage were replaced by loose, vascular, connective tissue. In some regions this tissue was found to be extending into the joint structures from the subchondral bone, while in others, it traversed the adherent cartilaginous surfaces. No inflammatory changes were observed. Post-mortem x-rays were entirely normal in one of these cases. The patient, in the other instance had had rheumatoid arthritis for twenty-five years but the x-rays again demonstrated no abnormalities in the sacro-iliac joints.

In three cases, small slit-like joint spaces were still present, but bony bridging had occurred across the external margins of the articulating surfaces. Microscopically, both capsular and synovial tissues as well as adjacent cartilage had been replaced by bridges of well-formed, dense bone (Fig. 7). Once these structures were fractured, the joints could be opened and they presented features similar to those of other specimens from the older age groups.

The final two specimens were completely fused due to bony ankylosis. In these, there was no evidence of even small portions of persistent joint spaces, and the sacral and iliac bones could not be separated. The most marked changes were seen in the specimens obtained from the case of Marie Strumpel's spondylitis. Here, thin islands of cartilage were the only remnants of the joint tissues (Fig. 8). The intervening structures were composed entirely of bone without inflammation or fibrous replacement. No traces of capsular or synovial tissues were found.

In the other case, although the cartilage was not grossly narrowed, bony invasion had produced marked irregularities and, upon microscopic examination complete bony union was demonstrated in several regions (Fig. 9). The patient, in this instance, had been treated for Hodgkin's disease with radiation to the mediastinum and spleen. Although there had been no musculo-skeletal complaints, x-rays of the abdomen and pelvis revealed obliteration of the sacro-iliac joints.

DISCUSSION

The changes observed in the sacro-iliac joints would appear to conform, generally, with those described by others[1, 5] who have conducted similar investigations on various peripheral joints. With a few exceptions, these observations

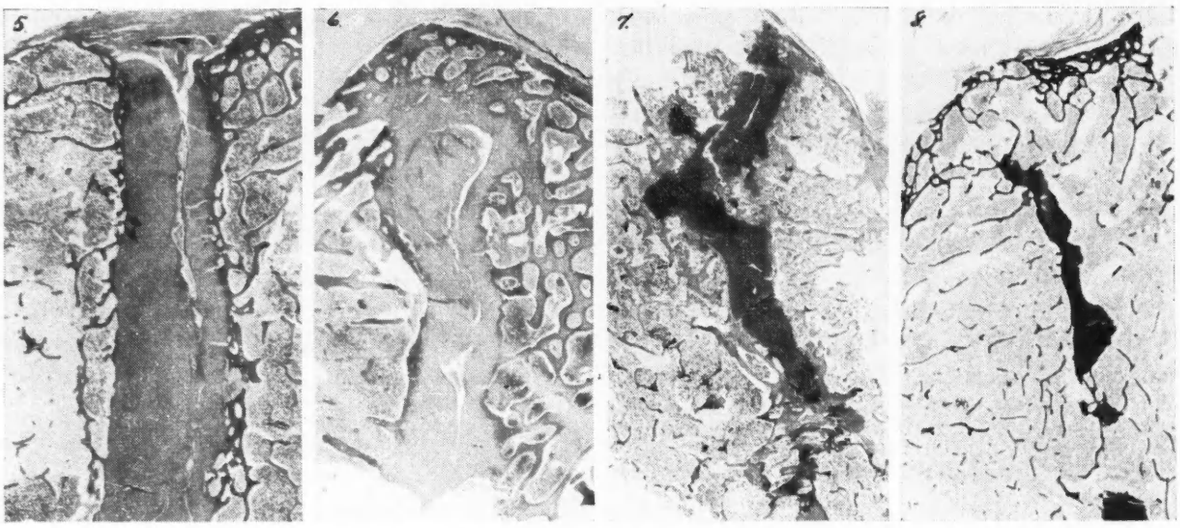


Fig. 5.—Section of the joint shown in Fig. 4. Fig. 6.—Section of a joint showing (a) bony bridge replacing the capsule; (b) partial obliteration of joint space by adherent articular cartilage. Fig. 7.—Portion of an ankylosed joint from a case of old Marie Strumpel's spondylitis showing an irregular remnant of cartilage and joint space and complete bony union in the lower portion of the photograph. Fig. 8.—Portion of a joint showing almost complete bony union.

would also agree with those of Sashin who was the only other writer, to our knowledge, to concern himself with the histological changes in the sacro-iliac joints, in the different age groups. With increasing age, there occurred, primarily, a progressive degeneration of articular cartilage with secondary bony alteration, and, to a lesser extent, changes in the capsule and synovial tissues.

As early as the 4th decade (or even possibly the 3rd) the articular cartilages of the sacro-iliac joints commenced to show evidence of degeneration. At first, this was characterized by only an irregular loss of the most superficial layer of the cartilage, but with increasing age, fibrillation and erosion occur, and gradual loss of large areas of even the deeper structures took place. Some older cases demonstrated filling of almost the entire joint space with amorphous, flaky or granular material which was thought to be necrotic, sloughing cartilage. In the more advanced stages of these degenerative alterations, hypertrophy of bone occurred about the margins of the joint, with the production of lipping and osteophytes. The joint capsules generally became thickened and were composed of dense, acellular, avascular, collagenous tissues while the synovia contained much more fibrous material than in the early age groups.

Unlike the peripheral articulations, the sacro-iliac joints showed a tendency to become fused during later life, even in the absence of clinical evidence of arthritic processes. This feature was present in 11 of the 41 cases over fifty years of age and was more frequently observed over the age of seventy. With the exception of two of these cases, it was felt that fusion was merely an exaggeration of the degenerative process already described. In some, the opposing surfaces were adherent due to intra-articular adhesion of the necrotic superficial debris, while in others, there was in addition, an invasion by loose, vascular connective tissue without evidence of inflammatory reaction. A third form of fusion due to the marginal bony bridges, perhaps, was indicative of a more advanced state of degeneration or rather another manifestation of the ageing process. Complete, intra-articular bony ankylosis was found in only two cases, and this feature was considered to be the late result of acquired disease rather than to a type of degeneration. Neither the gross nor the microscopic examination indicated the chain of events which had resulted in the ankylosis.

These observations, at first glance do not appear to conform with those of Sashin who reported bony ankylosis in 82% of males over the age of sixty years. However, his report describes merely bony bridging on the anterior margins of the joints without intra-articular ankylosis. These observations – although more frequent in occurrence than indicated by this study–are still in keeping with the hypothesis that such a feature is only a manifestation of osteoarthritic alterations.

The degenerative processes occurring in the sacro-iliac joints would then appear to be very similar to those observed in other joints. With

increasing age, destruction of cartilage occurs, probably, as a result of continued stress and strain. Due to the poor reparative abilities of cartilage, this destructive process is progressive, with resultant severe erosion and necrosis of cartilage, and to a lesser extent reactive bony hypertrophy. It may be that a vicious cycle develops with age. Injury resulting in erosion and necrosis of cartilage produces an amorphous debris filling the joint space. This interferes with nutrition of the superficial cartilage, rendering it more susceptible to further trauma and hence progressive degeneration ensues.

The sacro-iliac joints demonstrate at the most only very slight mobility, and because of this relative lack of motion, it is felt that other more pronounced degenerative features develop in a certain proportion of the older cases. Such is evident by the production of apparent fusion of these joints (20% in this series), an unusual manifestation of degenerative disease in the peripheral articulation. True intra-articular ankylosis has been apparent in only two of our cases and this is felt to be the result of acquired disease rather than a part of the ageing process.

SUMMARY AND CONCLUSIONS

1. A method has been described for procuring satisfactory specimens of the diarthrodial portions of the joints.

2. The sacro-iliac joints have been studied in 59 unselected post-mortems. In 48 cases, the progression of changes with advancing age was similar to that observed in peripheral articulations consisting of destruction of cartilage and secondary bony hypertrophy with thickening of capsule and synovium.

3. Eleven of the 41 specimens from patients over fifty years of age demonstrated fusion. In 9 of these, there was evidence that this was merely the result of advanced osteo-arthritic changes in relatively immobile joints. Two specimens were found to have complete intra-articular bony ankylosis, but none of the gross or histological features were indicative of the pathogenesis of the process involved.

We gratefully acknowledge the guidance and assistance of Dr. A. J. Blanchard, Director of the Department of Pathology, Sunnybrook Hospital, and his technical staff.

REFERENCES

1. COLLINS, D. H.: The Pathology of Articular and Spinal Diseases, Edward Arnold & Co., London, p. 316, 1949.
2. SASHIN, D.: *J. Bone & Joint Surg.*, **22**: 891, 1930.
3. DOTTI, L. B., PAPARO, G. P. AND CLARKE, B. E.: *J. Clin. Path.*, **21**: p. 475.
4. Gray's Anatomy.
5. BENNETT, G. A., WAINE, H. AND BAUER, W.: Changes in the Knee Joints at Various Ages, The Commonwealth Fund, New York, 1942.

"Parenteral nutrition will succeed only if the caloric demands of the patient who is unable to eat can be met, either parenterally or from his own stores. When such body stores are lacking, as is usually the case in chronic wasting diseases, caloric needs cannot be adequately met by the parenteral preparations now available. Accordingly, the need for a more effective intravenous calorigenic material is urgent. Fat emulsions plainly offer the only practical solution to this problem." (*Nutritional Reviews*, 9: 193, 1951, Caloric Priorities in Parenteral Nutrition.)

"The results of the second survey in Bataan province indicated that after two years of rice enrichment the beriberi incidence had declined from 12.76 to 1.55% of the population in the experimental area and to 8.7 in the control area. Furthermore, the severity of the disease diminished greatly in the experimental area so that cases of frank beriberi had almost disappeared. It was observed, on the other hand, that the severity of the disease actually increased in the control area for no known reason. A decline in beriberi incidence occurred in one control area, but this was traced to infiltration of enriched rice into 20 to 30% of the homes in this municipality." (*Nutrition Reviews*, 9: 218, 1951, Artificial Enrichment of White Rice in the Philippines.)

"One of the marked biochemical effects of the rice-fruit diet was a lowering of the serum cholesterol level from the average control value of 233 to 158 mgm.% after thirty-three days on the diet. The decrease in the serum cholesterol level from a normal level is not likely to play a specific rôle in the observed lowering of the blood pressure. In the reduction of the blood pressure the salt restriction is certainly important but the specific mechanism remains uncertain and is probably complex. It was observed, both under laboratory and field conditions, that semistarvation alone with no restriction in salt intake reduces blood pressure in both normotensive and hypertensive individuals." (*Nutrition Reviews*, 9: 233, 1951, Blood Pressure and Body Composition on the Rice-Fruit Diet.)

"Milk substitutes have aided greatly in providing adequate nutrition for infants and children allergic to milk. Strained meats and casein hydrolysates are two sources of protein that have been used for this purpose. These same proteins have been used in the feeding of premature infants. The nitrogen absorption in premature infants was 90.6% on formulas consisting of half-skimmed milk plus 10% added carbohydrate. On a similar formula in which meat supplied 30% of the protein intake, the absorption of nitrogen was 86.0%. When meat was the sole source of protein, the nitrogen absorption was 82.2%. Nitrogen utilization, however, was greater in the infants receiving all or part of their protein in the form of strained meat. Consequently, the nitrogen retention was comparable for both groups." (*Nutrition Reviews*, 9: 242, 1951, Protein Supplements in the Feeding of Premature Infants.)

Canad. M. A. J.
Feb. 1952, vol. 66

CASE REPORTS

POLYCYSTIC DISEASE OF THE LIVER

J. FRANK ELLIOTT, M.D., *Edmonton*

POLYCYSTIC DISEASE of the liver, congenital cystic liver or cystic disease of the liver is an uncommon condition in which one or more cysts of varying size, not parasitic in origin, develop in or from the liver.[1] Few physicians encounter more than one or two cases. The disease is rarely recognized clinically. The usual pre-operative diagnosis is hydatid cyst, amœbic abscess, primary or secondary carcinoma of the liver, hydrops of the gall bladder, pancreatic cyst, congenital cystic kidney or ovarian cyst. The correct diagnosis is usually established by operation or autopsy, occasionally by peritoneoscopy.[2] Punch biopsy of the liver is seldom diagnostic.

A 48 year old housewife was first seen in consultation on June 14, 1950. She was referred by her family physician because of marked liver enlargement. She complained of soreness in the right upper abdomen, which began about 1944. At this time her doctor told her that the liver was somewhat enlarged. Soreness and enlargement of the abdomen had been more marked for the past year. There was no real pain, but a feeling of distress, which was worse with exercise, particularly exercise involving the right arm. Fatigue, and eating a large meal also increased the distress. Rest gave some relief. The appetite was fair but she avoided fried foods and cream which produced a burning sensation in her throat. She had vomited occasionally during the past year, usually after drinking fluids. She believed that she had lost about 15 pounds in weight over the past year. Her usual weight was 155 pounds. Her general strength and energy had been poor for four or five years.

Bowel movements had been regular, two or three times a day, with no pain, mucus or gross blood. A bowel movement did not affect the distress. No jaundice nor change in the colour of the stools or urine had been noted. There had been no symptoms referable to the urinary tract except occasional nocturia. Her menstrual periods had stopped in 1948.

Past illnesses included measles, scarlet fever and an ear infection in childhood. She recalled an attack of severe pain in the right loin and in the right upper abdomen 30 years ago, shortly after her marriage. This had subsided in a week under hospital treatment. In 1932 a suspension of the uterus had been done. In 1948 she had been told that her blood pressure was elevated. She had taken digitalis regularly for a year.

She was born in England and came to Canada at three years of age. There was no history of residence in the tropics. She had six children alive and well. Her mother, aged 71, had been under medical care for hypertension and enlargement of the liver since 1948.

Examination showed a tense middle aged lady who did not appear ill. She weighed 138 pounds. The pulse was regular, 88 per minute, and the blood pressure 200/120. The heart was slightly enlarged to the left on percussion. No murmurs were heard. The chest was clinically clear.

The abdomen was distended in the right upper quadrant and there was bulging of the right flank. A hard nodular mass extended from the right costal margin to the right iliac crest. A firm rounded knobby edge could be felt extending obliquely across the mass and crossing the mid line at the level of the umbilicus. The lower portion of the mass was ovoid and more deeply situated. It extended downwards into the right iliac fossa, and ballottement from the flank could be demonstrated. Nodules of varying size were palpable on the surface of the upper portion. The mass moved with respiration, was dull on percussion and was not tender. The spleen was not palpable. There was an old lower abdominal surgical scar. Pelvic and rectal examinations revealed no abnormality. There was no œdema of the legs.

She was investigated in hospital on two occasions, as she stayed for only one day on her first admission. The urine showed a faint trace of albumin and an occasional white blood cell. The hæmoglobin was 15.8 gm. % and the white cell count was 7,900 with 80% polymorphonuclear neutrophils and 20% lymphocytes. The red cell sedimentation rate was 12 mm. in 1 hour (Cutler). The blood Kahn was negative. Serum bilirubin

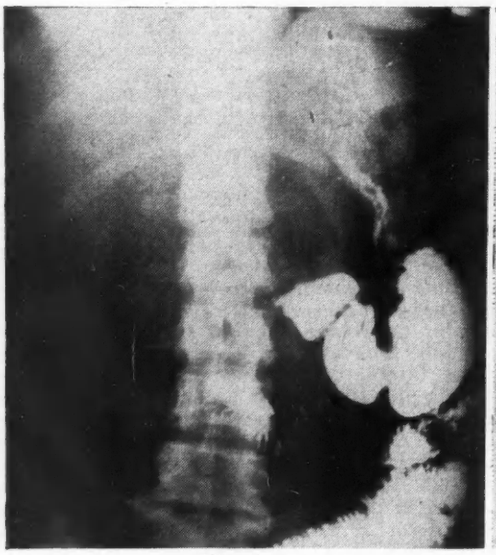


Fig. 1

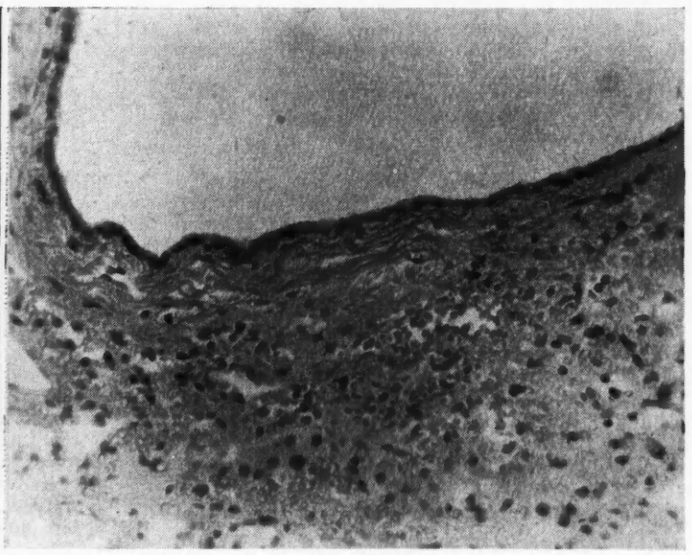


Fig. 2

Fig. 1.—X-ray showing stomach displaced downwards and to the left. **Fig. 2.**—Section through the wall of the cyst removed from the liver in this case. The epithelial lining is clearly shown (low power).

was reported as 0.19 mgm. % direct and 0.47 mgm. % indirect. The cephalin cholesterol flocculation test was negative in 48 hours. The prothrombin time was 77% of normal. Serum proteins were 7.7 gm. % with 3.9 gm. albumin and 3.8 gm. globulin. The Cassoni skin test for hydatid disease was negative. The chest x-ray showed elevated diaphragms and a transverse heart. A cholecystogram was attempted but no gall bladder shadow was visualized. Intravenous pyelogram, barium enema and barium examination of the stomach and duodenum revealed only displacement of organs by the mass in the right abdomen, as shown in Fig. 1. An electrocardiogram showed digitalis effect.

She was seen in consultation by Dr. T. S. Wilson who did a punch biopsy of the liver which showed only a few strands of liver cells. After consultation with members of the provincial Cancer Diagnostic Clinic, Dr. Wilson proceeded with an exploratory laparotomy on July 24. The differential diagnosis at this time included hydatid cyst and primary or secondary carcinoma of the liver.

At operation the entire mass was found to be the liver, which was for the most part composed of hundreds of distended, bluish, thin-walled cysts varying in size from a few mm. to 3 or 4 cm. The small amount of intervening liver tissue appeared normal. The process involved the entire liver, although the right lobe was more enlarged than the left. The appearance was quite similar to that of a large congenital cystic kidney. Other abdominal viscera including the gall bladder looked and felt normal. The appendix had been removed. No cysts could be felt in the kidneys.

About 10 c.c. of clear slightly yellow fluid was aspirated from one of the cysts and a small cyst about 1 cm. in diameter with a small amount of adjacent liver tissue was removed for biopsy. The fluid showed no cells, no hooklets and no scolices. Unfortunately no biochemical studies of it were done.

The pathological report, by Dr. J. W. Macgregor, is as follows: "A thin-walled cyst 1 cm. in diameter, blue-grey in colour, with attached greenish tissue at one pole. Sections of this cystic nodule show it to be a cyst of the liver. A small piece of liver tissue is adherent to the cyst in one area. The liver tissue looks quite normal. The liver cells are filled with glycogen. There are a few lymphocytes in portal areas. There is no lobular disarray. The cyst described in the gross seems to be directly beneath the liver capsule and is lined by cuboidal epithelium. In the wall of the cyst two tiny cysts lined with similar epithelium can be seen. There is no evidence of inflammation, new growth or parasitic disease. Diagnosis: Congenital cysts of liver" (Fig. 2).

Her convalescence was uneventful, and she was discharged from hospital on July 29. She was seen again in November, 1950, at which time there was little change in her symptoms or signs. She stated that she felt somewhat improved and had gained some weight since her fear of cancer had been removed.

At this time further information about the mother of the patient was obtained. The mother had known of liver enlargement since 1948, and radiological examination elsewhere had shown a cyst about 5 cm. in diameter in the left lobe of the liver. The cyst wall showed slight calcification. This had not caused symptoms and had not been investigated further.

DISCUSSION

Non-parasitic cysts of the liver are uncommon. Davis[3] mentions 499 cases reported in the literature. Ackman and Rhea[4] found only 10 cases in 6,141 autopsies over a twenty-four year period. There is considerable controversy as to the cause of the condition but the most widely accepted theory is that it is a congenital anomaly of the bile ducts or their precursors.[5, 1] Other possible causes include inflammation, degeneration and tumour formation. Single large cysts of the liver, unilocular or multilocular, comprise almost half of the cases in which the type of cyst is recorded.[3] These may or may not be due to the same process that results in polycystic disease of the liver.

Numerous classifications of non-parasitic cysts have been devised.[3, 4, 1] That of Ackman and Rhea[4] is as follows:

(A) Congenital.—(1) Teratomas; (2) lymphatic cysts; (3) blood vessel cysts; (4) ciliated epithelial cysts; (5) cystic degeneration of liver and kidneys; (6) bile duct retention cysts.

(B) Acquired.—(1) Degeneration cysts; (2) cystadenomata; (3) bile duct cysts associated with acquired cirrhosis of the liver.

Cystic disease of the liver is often associated with cystic disease of the kidneys. Of 85 cases reported by Moschcowitz,[6] 75 showed concomitant cystic kidneys. Cases of congenital cystic kidney show a much lower incidence of associated cystic disease of the liver, the figure varying from 5.5 to 28% in different series of cases.[7, 1] Some cases of polycystic disease of the liver may show cystic disease of other organs including the pancreas, lungs, spleen and ovaries. Other congenital anomalies such as polydactylism, meningocœle and spina bifida may also occur.

The mother of the patient described is reported to have a cyst of her liver. This suggests a possible hereditary factor in this case. Polycystic disease of the kidney is known to be familial in about 8% of cases,[8] and is believed to be hereditary in a few cases. There is little information available concerning heredity in polycystic disease of the liver.

The gross and microscopic findings in this disease are quite characteristic. Cysts are more common in the right lobe of the liver, but may be entirely confined to the left lobe. A single cyst may have a long pedicle and may be mistaken for an ovarian cyst prior to operation. The distended cysts have a bluish grey colour. Fluid from the cyst is usually clear, may have a yellowish colour, and seldom contains bile. A chocolate brown fluid may result from hæmorrhage into a cyst.

The cysts are usually lined by a single area of flattened cuboidal or columnar epithelium. In some cases the epithelial layer cannot be found, and is believed to have degenerated due

Canad. M. A. J.
Feb. 1952, vol. 66

to pressure. The middle coat is often described as showing three layers: (1) an inner layer of densely packed connective tissue with a few nuclei and many blood vessels, (2) a middle layer of less dense connective tissue with more nuclei, lymphocytes, blood vessels and dilated bile ducts, and (3) an outer layer of loose connective tissue with elastic fibres. The adjacent liver tissue appears normal except for distortion due to pressure.

The symptoms of this disease are usually due to pressure on adjacent viscera. Elevation of the diaphragm may result in palpitation, dyspnœa and cyanosis. Distortion of the stomach and duodenum may result in dyspepsia, distension after food, vomiting and loss of weight. Compression of bile ducts may produce jaundice, and compression of the ureter may produce hydronephrosis. Constipation or diarrhœa may result from distortion of the transverse colon. Ascites and œdema of the legs may follow portal obstruction. An acute abdominal emergency may result from rupture of a cyst, hæmorrhage into a cyst or, in the case of a pedunculated cyst, from torsion of the pedicle. Hepatic insufficiency rarely develops because of the well recognized regenerative ability of the liver cells.

Surgical treatment is possible when only one or several large cysts are present, or when the disease involves only a resectable portion of the liver.

SUMMARY

Polycystic disease of the liver was discovered at laparotomy in a 48 year old housewife who had known of liver enlargement for six years. The preoperative differential diagnosis was hydatid disease of the liver or primary or secondary malignancy. The liver was found to be largely replaced by numerous cysts of varying size filled with clear fluid. Microscopic examination of a biopsy specimen showed the typical appearance of this disease. The mother of the patient is known to have a cyst of the liver, which suggests a possible hereditary factor in this case.

The disease is probably a congenital defect of development of the bile ducts or their precursors. It may be associated with other congenital anomalies, most often congenital cystic kidneys.

The symptoms are usually due to pressure. If rupture of a cyst, hæmorrhage into a cyst or torsion of a pedicle occurs, the symptoms may be those of an acute abdominal emergency. Hepatic insufficiency rarely develops. The diagnosis is usually made at operation or autopsy.

My thanks are due to Dr. A. N. Brinsmead, Lac La Biche, who referred the patient; Dr. T. S. Wilson, Edmonton, who performed the aspiration biopsy and the operation; Dr. J. W. Macgregor, Provincial Laboratory, Edmonton, who reported the microscopic findings and supplied the photograph; Dr. J. L. Weatherilt, Lamont, Alberta, who referred the patient's mother; Drs. Bonnell and Roberts, Victoria, B.C., who performed the radiological examinations of the patient's mother; and Drs. Proctor, Duggan and Smith, Edmonton, who performed the radiological examination of the patient.

REFERENCES

1. CLAGGETT, O. T. AND HAWKINS, W. J.: *Ann. Surg.*, **123**: 111, 1946.
2. NIEMETZ, D., SOKOL, A. AND MEISTER, L.: *Ann. Int. Med.*, **31**: 319, 1949.
3. DAVIS, C. R.: *Am. J. Surg.*, **35**: 590, 1937.
4. ACKMAN, F. D. AND RHEA, L. J.: *Brit. J. Surg.*, **18**: 648, 1931.
5. MOOLTEN, S.: *New York State J. Med.*, **43**: 727, 1943.
6. MOSCHCOWITZ, E.: *Am. J. M. Sc.*, **131**: 674, 1906.
7. LUZZATTS: Quoted by Claggett, O. T. and Hawkins, W. J.(1).
8. OPPENHEIMER, G. D.: *Ann. Surg.*, **100**: 1136, 1934.

GAUCHER'S DISEASE: A CASE COMPLICATED BY PREGNANCY

J. F. ELLIOTT, M.D., *Edmonton*

GAUCHER'S DISEASE is rare. Groen in 1948 estimated that 250 cases had been reported in the literature.[1] It is known to be an inborn error of metabolism in which kerasin, a galactosidocerebroside and sometimes an abnormal glucosidocerebroside, occurs in abnormal amounts in certain cells of the reticulo-endothelial system.[2]

The usual clinical features include splenomegaly, hepatomegaly, enlargement of lymph nodes, more marked in the visceral than the superficial groups, pain and tenderness over the long bones, pallor, a hæmorrhagic diathesis, pingueculæ, malar flush, myopia and sometimes abnormal pigmentation of the skin of the legs and face.

The laboratory findings include hypochromic anæmia, leucopenia, thrombocytopenia and a low or normal serum cholesterol. Bone marrow examination usually shows typical large pale-staining Gaucher cells, and x-ray examination may reveal areas of rarefaction in the femora and sometimes in other long bones.

There is no sex predilection. The disease may occur at any age and has been reported in an infant seven days old[10] and in a man of 79 years.[7] Cases occurring in childhood progress more rapidly and may be associated with nervous symptoms and with progressive degeneration of the cerebral cortex. Adult cases usually follow a slowly progressive course with remissions, and death may occur from tuberculosis, as in Gaucher's original case, or from other intercurrent infection. In elderly people the disease is often an incidental finding in the course of the investigation of relatives of a known case. Many of the cases reported occurred in people of the Jewish race.

Gaucher's disease is apparently hereditary, and probably begins as a mutation which is then transmitted as a simple dominant trait. In successive generations it tends to occur at an earlier age and to run a more acute course. Thus the mutation tends to extinguish itself.[1] No satisfactory treatment is known.

The following case is reported because of the rarity of the disease, the apparent deleterious effects of pregnancy and the apparent improvement following splenectomy.

Mrs. O.I., a 25 year old housewife, reported to her obstetrician on January 12, 1949, believing herself pregnant. Her last menstrual period had begun on September 29, 1948, and had lasted for three days. She was referred because she was found to be markedly anæmic, and her spleen was considerably enlarged. She did not report for consultation until March 14. At this time she had no complaints. She stated that she had been born in Saskatchewan of Russian parents who were alive and well, and that she had lived all her life in Canada. She had done office work, and had been in the women's division of the Canadian army from May 1943 until March 1946. She had known that she was anæmic since rejection as a blood donor by the Red Cross in 1944, and had taken iron occasionally. She recalled measles, mumps, diphtheria and pneumonia in childhood. Her only hospitalization had been for bronchitis in 1945. For several years her gums had bled easily when she brushed her teeth. A severe nosebleed in 1949 had required insertion of a pack. She had been married in December 1947 and this was her first pregnancy.

Two full brothers and five full sisters, one of whom was a twin,* were alive and well, although several sisters had taken iron for anæmia. Three half-brothers and two half-sisters were alive and well. One half-brother had died from diphtheria in childhood. None of the relatives was known to have suffered from severe anæmia nor to have had an enlarged spleen. None of the relatives has been available for investigation to date.*

Examination showed a pale young female with a protuberant abdomen. The temperature was normal, the weight 117 pounds, the pulse regular, 84 per minute, and the blood pressure 120/80 mm. of mercury. The skin and hair were somewhat dry. There was a partial upper denture. The heart was not enlarged on percussion. There was a systolic murmur over the pulmonic area which varied with respiration, and a soft variable systolic murmur at the apex which was not transmitted. The chest was clinically clear.

The abdomen was distended and there was bulging of the left flank. The uterus was enlarged to the level of the umbilicus. The left half of the abdomen was filled by a firm mass which extended from the costal margin to the iliac crest. The medial edge of the mass was smooth, rounded and firm and a notch could be felt at the level of the umbilicus. This mass moved with respiration, was dull on percussion and was not tender. The liver was not palpable, but its edge could be percussed just below the right costal margin.

The remainder of the physical examination was within normal limits.

She was investigated in the University of Alberta Hospital from March 21 to March 27, 1949, and the following laboratory data were obtained: The urine was negative for sugar and albumin, and microscopic examination showed occasional urates. The red cell count was 2,500,000 and the hæmoglobin was 7 gm. %. The white blood count was 5,600 with 76% polymorphonuclear neutrophils and 24% lymphocytes. The reticulocyte count was 0.1%. The platelet count was 210,000 and when repeated 250,000. The clotting time was five minutes and the bleeding time two minutes. Gastric analysis showed no free acid without histamine, and 22 units after histamine. The hæmatocrit reading was 29. Examinations of stained blood smears showed a microcytic hypochromic anæmia with some poikilocytosis. The red cell sedimentation rate was 29 mm. in one hour (Cutler). The red blood cell fragility was slightly increased, with hæmolysis beginning at 0.46% saline and complete at 0.34%. Control readings with normal red cells were 0.44 and 0.32%. The serum bilirubin was normal, 0.2 mgm., with an indirect Van den Bergh reaction. Marrow smears showed an active marrow with a normoblastic picture. The chest x-ray was normal.

The patient could not be persuaded to stay in hospital for further investigation and was discharged with a tentative diagnosis of anæmia with splenomegaly (Banti's syndrome). Ferrous sulphate, folic acid and injections of liver extract were administered over the next three months, with no apparent effect on her hæmoglobin level. On June 3 her red blood count was 2,640,000 and her hæmoglobin 7.7 gm. %. The white blood count was 8,300 with a normal differential.

In discussion with the obstetrical service it was decided to arrange for her admission a week before her baby was expected, and to give her blood transfusions. However, she was admitted in labour on the afternoon of June 12, and three hours later delivered a male baby weighing 5 pounds and 4 ounces. There was no excessive bleeding. The measured blood loss was 50 c.c. She looked very pale and was given a transfusion of 500 c.c. of blood. Blood studies were done on June 13. The red cell count was 1,430,000 and the hæmoglobin 4.0 gm. %. The hæmoglobin had dropped to little more than half of its previous level in nine days, although she had received a blood transfusion. After delivery the splenic enlargement had not changed, but the liver could be felt about 8 cm. below the right costal margin. The white blood count was now 2,100 per cubic mm. with a normal differential. The platelet count was 69,000. The clotting time and bleeding times were normal. The red blood fragility test was normal. The serum bilirubin was slightly elevated: direct 0.30 mgm. % and indirect 0.72 mgm. %.

Her postpartum course was uncomplicated. During her stay in hospital she was given eleven blood transfusions of 500 c.c. each. She was discharged on June 26. At this time her red blood count was 4,310,000 and her hæmoglobin 12.7 gm. %. The white blood count had risen to 4,450 with 73% polymorphonuclear neutrophils, 25% lymphocytes, 1% eosinophils and 1% monocytes.

The baby appeared healthy, though premature. His red cell count was 6,900,000 with 18.1 gm. % of hæmoglobin. He regained his birth weight by the time of discharge and has had no serious illness since.

*The twin sister has been examined since this was written, and she also shows anæmia, pingueculæ, and enlargement of the liver and spleen. She is being investigated further.

Canad. M. A. J.
Feb. 1952, vol. 66

Following her discharge from hospital the patient felt well and did her own housework. Her anæmia recurred very slowly as indicated in Fig. 1. In July 1949 the liver felt somewhat larger than before and its edge extended to the level of the umbilicus. At this time the serum bilirubin was normal, but the cephalin cholesterol flocculation test was four plus in 48 hours. The red cell fragility was normal and the reticulocyte count was 0.8%.

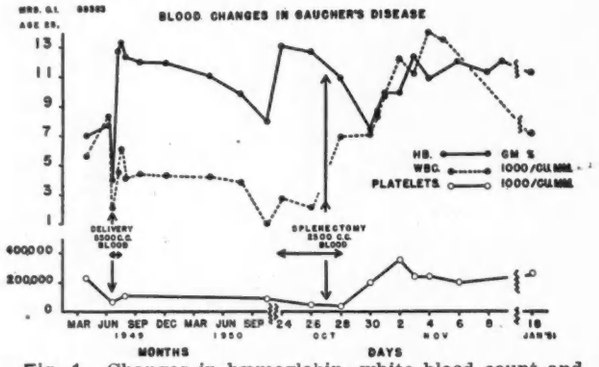


Fig. 1.—Changes in hæmoglobin, white blood count and platelet count, with pregnancy, delivery, blood transfusions and splenectomy.

By October 1950 the hæmoglobin had fallen to about half the normal level. The patient complained of palpitation and ease of fatigue. There was a dragging distress in the left upper abdomen. She was readmitted to hospital on October 18, 1950.

On this admission the red blood count was 2,740,000 and the hæmoglobin 7.9 gm. %. The white blood count had dropped to 1,000 and of these the polymorphonuclear neutrophils constituted 39%, the lymphocytes 52%, the monocytes 8% and the basophils 1%. Stained blood smears showed hypochromia, poikilocytosis, anisocytosis and a decreased number of platelets. The platelet count was 90,000 per cubic mm. and the bleeding time was prolonged to 9½ minutes (Duke). The serum bilirubin was slightly elevated—direct 0.12 mgm. % and indirect 1.03 mgm. %. The cephalin cholesterol flocculation test was four plus in 24 hours. The red blood fragility was again slightly increased. The hæmatocrit reading was 29. The prothrombin time was 87% of normal. The serum proteins were 7.4 gm. % with 4.2 gm. albumin and 3.2 gm. globulin. The blood N.P.N. was 33.5 mgm. %. Barium examination of the stomach and duodenum was normal except for displacement of these viscera to the right. An intravenous pyelogram showed that the left kidney was displaced downwards and medially.

A second bone marrow examination was performed and reported by Dr. R. E. Bell as follows: "The difficulty encountered in obtaining marrow may indicate a hypoplasia of the bone marrow. The findings on the smear indicate some normoblastic hyperplasia relative to other cell types. Although the large macrophages have many characteristics of the cells seen in Gaucher's disease, they are not entirely typical and are not present in sufficient numbers to warrant a diagnosis of this disease on the marrow findings alone. Diagnosis: (1) anæmia, (2) leukopenia, (3) hypoplastic bone marrow."

Most of the abnormal findings—splenomegaly, hypochromic anæmia, granulocytopenia, thrombocytopenia, elevated serum bilirubin with an indirect Van den Bergh reaction, and a slight increase in red blood cell fragility—suggested hypersplenism, and splenectomy seemed indicated whatever the underlying disease process might be.

Accordingly no further bone marrow studies were done and she was operated on by Dr. T. S. Wilson on October 27, following preparation by blood transfusions and vitamin K. The liver was markedly enlarged, but appeared normal otherwise. The spleen filled most of the left side of the abdominal cavity and there were no adhesions. The pressure in the mesenteric veins was 140 mm. of water which was considered to be within normal limits. The spleen and a small accessory spleen were removed and a biopsy taken from the liver.

The pathological report by Dr. J. W. Macgregor was as follows:

"(1) Spleen: The specimen consists of a greatly enlarged spleen measuring 28 by 16 by 8 cm. and weighing 1,721 grams. The surface is smooth apart from several deep fissures and is a pinkish grey in colour. The capsule seems slightly but uniformly thickened throughout and shows a very fine trabeculated character. The pulp is rather soft and the capsule tends to wrinkle when the organ is handled. On section, the pulp is moderately firm and has a uniform deep red surface. There are no areas of hæmorrhage or necrosis.

"Sections of the spleen show a most unusual histological picture. The normal pulp is largely replaced by clumps of large pale cells in alveolar arrangement. These cells often seem to line the splenic sinuses and enclose numerous red blood cells. The individual cells are large and show a peculiar finely striated cytoplasm. The lymphoid elements, Malpighian corpuscles and splenic trabeculæ are inconspicuous. The histological features are those of Gaucher's disease.

"(2) Section of the small liver biopsy shows no marked disturbance of lobular structure. Scattered through the liver lobules, however, there are noted clumps of large cells with a finely striated cytoplasm which seem identical in appearance to similar clumps of cells previously seen in the spleen from this case. These cells are those of the type found in Gaucher's disease. Special glycogen stains separate very sharply the Gaucher cells from the normal liver cells.

"(3) Sections of the accessory spleen show identical findings to those previously observed in the spleen

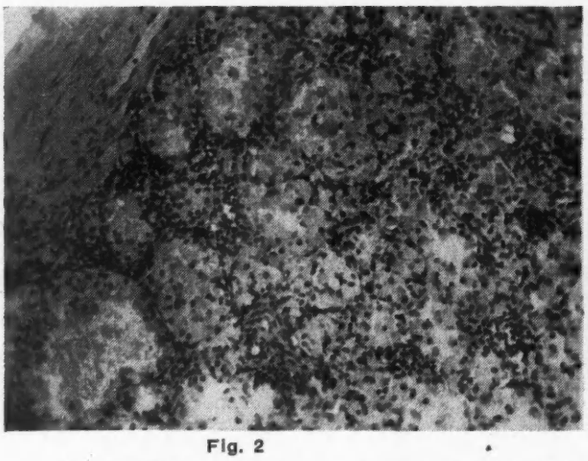


Fig. 2

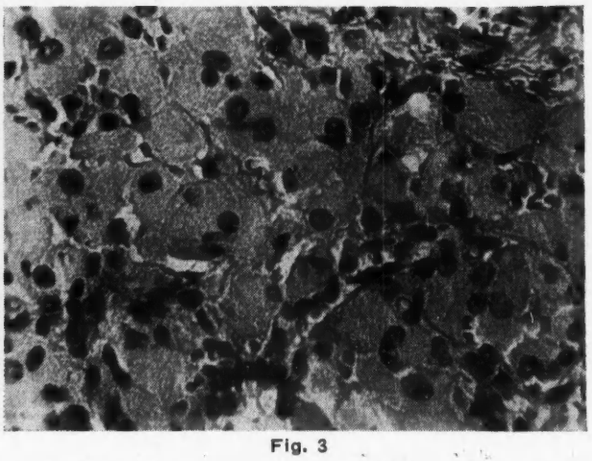


Fig. 3

Fig. 2.—Microscopic appearance of section of spleen, low power. Fig. 3.—Microscopic appearance of section of spleen, high power.

proper. These findings consist of alveolar clumps of large cells with finely striated cytoplasm lining splenic sinusoids and outlined very clearly by reticulum stains. Diagnosis: Gaucher's disease involving spleen, liver and accessory spleen."

The microscopic appearance of the spleen is illustrated in Figs. 2 and 3.

Biochemical studies of the spleen were carried out by the hospital laboratory and Dr. R. E. Bell reported:

"Cerebrosides constitute 0.358 gm. per 100 gm. spleen or approximately 2.4 gm. per 100 gm. spleen dry weight. The estimation was based on the reducing capacity of extract prepared by a modification of Thannhauser's method." Dr. Bruce Collier of the University Biochemistry Department analyzed splenic tissue and reported: "A portion of formalized spleen was treated by the method of Kaye for isolation of kerasin.[12] The yield was 0.9 gm. per 100 gm. dry weight of spleen. The melting point was 188 to 191° C. (corrected)."

Following this report the serum cholesterol was determined and reported as 118 mgm. %. X-rays of the skull, both femurs, hands and feet were taken but no abnormalities were found. Re-examination of the patient showed small pingueculæ, but these were not more marked than might occur in patients without Gaucher's disease. No abnormal pigmentation of the skin was present.

The patient had an uneventful convalescence except for a fever which subsided when penicillin injections were discontinued. The red blood count and hæmoglobin dropped for three days after the operation and then gradually rose again. The number of white blood cells increased to slightly above normal values. The platelets rose to 202,000 within 48 hours. These changes are illustrated in Fig. 1.

She was discharged from hospital on November 10, 1950. In January, 1951 she reported that she felt considerably improved. The dragging distress was gone from the abdomen and she no longer noticed palpitation on exertion. On January 18 the hæmoglobin was 11.2 gm. %, the white cells 7,100 and the platelets 262,000.

SUMMARY

A case of Gaucher's disease in a 25 year old female has been described. She was first seen during pregnancy with a marked hypochromic anæmia and splenomegaly. At this time the clinical picture suggested the diagnosis of Banti's syndrome. She became markedly anæmic in the last nine days of her pregnancy, but gave birth to an apparently normal, though premature, baby. Following multiple transfusions her anæmia recurred very slowly and her liver became enlarged. The diagnosis of Gaucher's disease was suggested by the second bone marrow examination, and confirmed when splenectomy was performed for hypersplenism. The blood picture improved following removal of the spleen.

My thanks are due to Dr. J. R. Vant, Professor of Obstetrics and Gynæcology at the University of Alberta Hospital, who referred this case; to Dr. T. S. Wilson of the Department of Surgery, who performed the operation; to Dr. R. E. Bell, Director of the Hospital Laboratory, who examined the bone marrow, suggested the correct diagnosis and carried out kerasin estimations; to Dr. J. W. Macgregor, Professor of Pathology, who examined the liver and spleen and supplied reports, pictures and advice; and to Dr. Bruce Collier, head of the Department of Biochemistry, who did kerasin determinations.

REFERENCES

1. GROEN, J.: *Blood*, 3: 1238, 1948.
2. OTTENSTEIN, B., SCHMIDT, G. AND THANNHAUSER, S. J.: *Blood*, 3: 1250, 1948.
3. GAUCHER, C. E.: De l'epithelioma primitive de la rate, These de Paris. 1882.
4. BRILL, N. E., MANDLEBAUM, F. S. AND LIBMAN, E.: *Am. J. M. Sc.*, 137: 849, 1909.
5. LIEB, H.: *Ztschr. f. physiol. Chem.*, 140: 305, 1924.
6. MORGANS, M. E.: *Lancet*, 253: 576, 1947.
7. PETIT, J. V. AND SCHLEIDER, E. M.: *Am. J. Clin. Path.*, 13: 260, 1943.
8. GROEN, J. AND GARRER, A. H.: *Blood*, 3: 1221, 1948.
9. HOFFMAN, S. J. AND MAKLER, M. I.: *Am. J. Dis. Child.*, 38: 775, 1929.
10. SIEGMUND: Quoted in (9).
11. PICK, L.: *Am. J. M. Sc.*, 185: 453, 1933.
12. KAYE, I. A.: *J. Lab. & Clin. Med.*, 25: 1117, 1940.

SPECIAL ARTICLE

PROPOSED ACTION PROGRAM FOR CIVIL DEFENCE CASUALTY SERVICES*

K. C. CHARRON,† *Ottawa*

THE WORKING PARTY on Casualty Services, at a meeting held in Ottawa on November 12, 1951, recommended certain steps as a means for translating paper planning into early and energetic action. The committee emphasized the need for uniform action across the country in order to avoid gaps in the support program. This is essential in Canada as shortages in professional personnel and essential facilities, such as hospitals, will make it necessary to arrange for assistance from communities which may be many miles from the disaster area. In suggesting a first phase objective for the country as a whole, and a breakdown for individual provinces, it is appreciated that the figures are tentative and can only be finalized after discussion with the Civil Defence Health Service planners in each of the provinces. The first phase action program for Civil Defence Casualty Services in Canada, as recommended by the Working Party, is as follows:

1. The Working Party stressed the need for the immediate appointment of the following for target and mutual aid areas. (See Civil Defence

*Prepared by the Department of National Health and Welfare, Ottawa.
†Chief, Civil Defence Health Planning Group.

Canad. M. A. J.
Feb. 1952, vol. 66

Health Services Manual Fig. B.3). (a) Director of Civil Defence Health Services. (b) Advisory Council—with representatives from professional associations, voluntary agencies and governmental groups in the community concerned with health. (c) Assistant Directors of Branch Services.

It was appreciated that in many cases these appointments had already been made but certain key areas had not as yet carried out this important preliminary step. In particular, the importance of the Advisory Council was stressed as a means of obtaining the support and active co-operation of professional and voluntary groups.

2. When the appointments mentioned in 1 had been completed it was recommended that regional meetings be held to allow local, provincial and federal health services planners to discuss problems of mutual interest.

3. (a) Target and mutual aid areas should prepare a careful inventory of all local resources of personnel, facilities and equipment. When these resources have been carefully assessed it would be possible to determine the additional assistance required from more distant communities.

(b) In order to assist with this assessment it was recommended that provincial and local organizations be supplied with information regarding physicians, dentists and pharmacists available from registers kept by national organizations and by departments of government. Consideration is also being given to an inventory of nursing resources in Canada.

(c) It was stressed that Civil Defence Health Service planners should avoid, as far as possible, recruiting persons of military age or members of the reserve forces for key position in the Civil Defence Health Service Organization.

4. (a) The members of the Working Party considered it essential that in order to ensure uniformity of action and rapid progress in the development of health service plans in target and mutual aid areas, small full-time units be employed in larger target areas and part-time units in smaller. The establishment in each case would depend on the size and importance of the target area. For example, in the larger centres, it would probably consist of a physician, nursing consultant and necessary clerical staff.

(b) The Working Party also considered that similar units would be required at provincial level to co-ordinate plans within the province.

5. *First aid stations.*

(a) It was recommended, as a first phase development, that a minimum of 150 first aid stations be established across Canada and that these units be organized and personnel trained to operational level as quickly as possible.

(b) A tentative provincial breakdown of the figure suggested in 5(a) can be estimated roughly on the number and importance of the target areas in a province and the strategic location of certain other communities as immediate support areas. However, other variables will occur and these tentative figures can only be finalized after discussion with provincial planners.

(c) The Working Party accepted the staffing pattern for First Aid Stations set out in the Civil Defence Health Services Manual, Section D., page 8. It recommended also that reserves of personnel be provided to allow for casualties. The casualty factor recommended was one-half in the case of professional personnel and one-third for non-professional groups. The lower casualty factor for non-professional persons was suggested as it was considered practical in most cases to recruit personnel for this group from the periphery or outside the potential target.

(d) First aid supplies required for training—the Working Party recommended that training kits be provided for each first aid station formed and that the Civil Defence Health Planning group work out the items and quantities required for training. Details are attached as Appendix A of this memorandum.

(e) Supplies for first aid stations—the Working Party accepted the item listed in the Civil defence Health Services Manual, Section D., pages 9 to 11. It recommended the immediate procurement of such supplies in quantities sufficient to meet the requirements of the number of first aid stations to be established. They further recommended the storage of such supplies at regional bases with local storage when the state of emergency indicated this further distribution.

6. *Hospitals*

(a) *Existing hospitals of all types.*—(1) It was recommended that detailed emergency plans be prepared for all existing hospitals in target and mutual aid areas and in other cities with a population of over 50,000. These plans should include the allocation of staff for emergency duties. (2) It was further recommended that similar detailed emergency plans be prepared for existing hospitals in reception and mobile support communities which are located at points suitable for use as base hospital units..

In order to assist with the detailed planning and to ensure that the results are comparable, a hospital sub-committee is preparing a standard hospital planning survey kit. This material will be reproduced and distributed early in 1952.

(b) *Improvised hospitals.*

(1) It was recommended that detailed emer-

gency plans be prepared for buildings considered suitable for use as improvised hospitals in target and mutual aid areas, also in cities with a population of over 50,000. These plans should include the allocation of staff to these emergency units. (2) It was suggested also that the survey of local resources be carried out by survey teams consisting of a hospital administrator, a nursing consultant and an experienced surgeon.

(c) *Additional professional personnel required to staff emergency hospital units.*

(1) Affiliated units of physicians for hospital services—The Working Party accepted the details set out in the Civil Defence Health Services Manual, Section E. 2, pages 9 to 11. It recommended that these units be set up as quickly as possible and in sufficient number to provide adequate assistance for the potential target areas. The actual number to be established in each province could be determined after discussion with provincial Civil Defence Health planners. (2) The Working Party also stressed the need for specialist teams but considered that more information should be obtained on the type of specialist service required. The Civil defence Health Planning Group is to obtain this information and it will form part of the advice issued for subsequent casualty service development.

(d) *Hospital supplies.*

The itemized list of essential medical supplies appearing in the Civil Defence Health Services Manual as Appendix B1, was accepted by the Working Party. It was recommended that steps be taken immediately, as a part of this first phase program, towards the procurement of sufficient of the supplies listed as would meet the requirements of at least 50,000 casualties. It was further recommended that such supplies be stored at regional centres at locations which are readily accessible to potential target areas.

7. *Casualty service transportation arrangements.*

(a) It was recommended that local Civil Defence Health Service planners arrange with the transportation services of their civil defence organization to have vehicles allocated to service the various casualty service units and on a scale consistent with the ambulance services section of the Civil Defence Health Services Manual, Sec. D., pages 12-13.

(b) Such local planners were also reminded of the need for detailed planning of transportation to and from more distant points and that these details should be arranged in consultation with the provincial authorities.

(c) The Working Party also recommended that the advice of the Federal Civil Defence Transportation Committee be obtained on these long distance transportation problems.

8. *Casualty service communication arrangements.*

A similar approach to that adopted for transportation arrangements, was recommended for communications.

9. *Steps recommended to assure energetic action.*

(a) It was recommended that the details of this suggested action program be submitted to the Dominion Council of Health for its consideration and support.

(b) It was further recommended that the Minister of National Health and Welfare be asked to inform the Provincial Ministers responsible for civil defence, of the details of this action program and request that such Ministers do their utmost to see that the program is carried out in their provinces. Also, that the Minister of National Health and Welfare be asked to write to the National professional association giving them the details of the program and urging their active support.

(c) It was also suggested that a member of the Federal Civil Defence Health Planning Group visit each of the provinces in the immediate future to discuss the details of the action program with Provincial Civil Defence Health planners.

10. *Objective deadline.*

The Working Party for Casualty Services recommended that June 30, 1952, be regarded as the date by which all action required to implement this first phase program be completed.

Appendix A.—Supplies and equipment required for the training of first aid station personnel.

One unit as listed below should be provided for training purposes for each First Aid Station.

Item	Amount
Stretchers	4
Blankets	8
Instrument set, 1, each containing:	
Scissors, surgical, Mayo 5½ inch, straight	1
Scissors, surgical, Mayo 5½ inch, curved	1
Forceps, hæmostatic, curved	12
Forceps, hæmostatic, straight	12
Forceps, tissue smooth, 5½ inch	1
Forceps, tissue, rat-toothed, 5½ inch	1
Needle driver	1
Retractor, general operating, nested, one 8¼ inch, one 8½ inch, set	1
Handles, knife No. 3	1
Blades, No. 10, package of 6	
Tube, breathing (airway), hard rubber or metal (adult)	1
Tube, breathing (airway), hard rubber or metal (child)	1
Tube, tracheotomy, large (adult)	1
Tube, tracheotomy, (child)	1
Scissors, bandage	6
Dressing, first aid, large military type	24
Bandages, gauze, 4-inch by 6 yards with woven edge	24
Cellulose dressing, gauze facing, medium size, first aid treatment of burns	24
Cellulose dressing, gauze facing, large size, first aid treatment of burns	12

Bandages, tensile, (for cellulose dressing), 3-inch	12
Bandages, tensile, (for cellulose dressing), 6-inch	12
Bandages, triangular muslin, 52- by 37- by 37	6
Cotton waste, pounds	12
Pins, safety, large, package 12's	6
Splints, sets	6
Pencils, indelible	3
Tourniquet	1
Tags, emergency medical, book of 20's	5
First Aid Station log book	1
Pencils, skin	3
Razor blades, package of 10	1
Razor blade holders	3
Basins, 9 by 6 by 1⅞ inches	1
Splints, Thomas, complete	6
Splints, Kramer, 31/2 by 31 inches	2
Splints, Kramer, 3½ by 151/2 inches	2

WORLD MEDICAL ASSOCIATION

Extracts from report to the Executive, Canadian Medical Association

NORMAN H. GOSSE, M.D., *Halifax*

CANADA was represented at the 4th meeting of the General Assembly of the World Medical Association in Stockholm this year by Dr. T. C. Routley, Chairman of Council of WMA, and myself as official delegates from our Association. Other Canadians present were Dr. Gérin-Lajoie as Assistant to the Chairman of Council and official interpreter, Dr. Margaret Gosse who accompanied me and who was accorded the title of alternate delegate, and Dr. Feasby who took part in the meeting of Medical Editors conducted by Dr. Morris Fishbein, Editor of the *WMA Journal.*

Of the forty-five or more national medical associations having membership in WMA thirty were represented. Thirteen other national and international bodies were also represented bringing the attendance to 207. Important among international representatives were those of the World Health Organization (WHO) and the International Labour Organization, both governmental bodies and both apparently recognizing the importance of a close liaison with WMA.

Three official languages were recognized—English, French and Spanish—and there was simultaneous translation of all proceedings in those languages.

The financing of this organization is largely through the United States Committee Inc. which in 1951 collected $75,455.00, two-thirds of which was contributed by medical organizations and by individual doctors. There is a small per capita tax upon all member organizations of WMA but no country is excluded because it cannot or does not meet this tax. The account received from this source falls far short of making the Association self-supporting, and its budget goes up from year to year.

The business of the meeting was extensive and varied and under President Dag Knutson of Sweden was conducted in a very business-like manner.

There was full recognition of the importance of keeping in close association with WHO and other international bodies whose objective may be the same as ours but whose ideas as to methods are not necessarily the same. It was definitely felt that since WHO frequently feels called upon to make recommendations to its constituent governments respecting medical affairs, Medicine's views should be better represented in that body before such recommendations are formulated. This becomes the more important when that body through the United Nations would make conventions of their recommendations, binding on the subscribing nationals. It is felt then that more intimate relations should exist between the two bodies and that the way to accomplish that within the present framework of WHO is to have the various governments name to the WHO delegation a representative from their respective national Medical Associations. It was urged that this objective should be aimed at by the respective national Medical Associations. Canada is in the unique position of having had a representative from organized medicine act for our Government as a delegate to WHO a few years ago, in the person of Dr. Routley, who would be expected to serve alike both profession and Government despite the adage regarding the serving of two masters.

Two reports considered by WMA were of great importance. They were Social Security and Medical Education.

Social Security.—There was—as might be expected—a great deal of discussion on this subject. Much of it was by men well-informed and capable of penetrating criticism. Some of the adverse criticism was pointed at the International Labour Organization (ILO) because although it is apparent that virtually all of the "state" or "national" illness and invalidity insurance schemes have a large deficit and although such schemes have constantly been drafted without the assistance of Medical Associations, ILO is now seeking to establish minimum and maximum standards of social assistance, again while no government, represented in ILO, consults the profession of medicine within its borders. It was suggested that since social security in its widest aspect is a medical problem, if ILO would arrive at satisfactory minimum standards to be adopted on a world scale, it should act in collaboration with WMA, or the results achieved will not last.

The discussion on this subject alone pointed up very clearly the great need for an organization like WMA to provide that practical and

stabilizing quality in international affairs which our own Association would provide in national affairs.

Medical Education.—Contributions to this subject were made by many on the occasion of the presentation of the Committee report. Evolving from it were the decisions: (a) that the time had arrived for an international conference on Medical Education; (b) that it be sponsored by WMA, to take place in 1953 immediately before or after the 7th General Assembly. (c) that Council for Co-ordination of International Congresses of Medicine, WHO, and UNESCO be asked to participate in the conference; (d) that member National Medical Associations be invited to co-operate in the Educational Conference.

The importance of making the conference a doctors' conference was stressed by Dr. Gregg of Great Britain on the ground that only the practising doctor can evaluate the strength and weakness of his education; and the importance of instituting study Committees in each country so that information and ideas may be pooled and exchanged was well shown.

CANADA AND WMA

Canada's place in the councils of WMA is high. This is not simply because of the fact that Canada is one of the countries that has paid its taxes, but because of the contribution that we have made to the success of the organization through our representative, Dr. T. C. Routley, who up to the September meeting was Chairman of Council of WMA. Perhaps we would not have learned much of the regard for Canadian Medicine and its peripatetic representative were it not for the fact that Dr. Routley had decided not to allow himself to go in nomination again for the Chairmanship of Council, and had declined many requests to continue. Then one heard it; and finally, in appreciation of his great contribution to the success of that body, Council decided to take advantage of a provision in the by-laws and to create a *new* office for him—that of General Consultant. This would give him the right to attend as an official of Council, and at the same time secure to WMA his assistance and advice as may be required. This was planned and recognized as an honour to a man who had brought high qualifications to the chair of Council; and Canada was honoured through him.

One was impressed with the fact that many delegates attending the General Assembly had been attending for some time and felt quite at home while newer men took time to find their feet. In consequence, it is my recommendation to the Executive of the CMA that consideration be given to effecting continuity of office for at least one of the delegates for a period longer than a year.

In general we were impressed by what WMA has accomplished in four short years. National sensitiveness was still apparent in spots but one needed no clairvoyance to adopt the belief that as the years go by WMA will attain a position of great significance in world affairs—medical and non-medical—not the least, it is hoped, will be that of securing a much greater measure of international understanding and goodwill.

CLINICAL AND LABORATORY NOTES

CLINICAL USE AND ABUSE OF ANTIHISTAMINES*

H. S. MITCHELL, M.D., *Montreal*

So MUCH has been published in the past six years on the antihistaminic drugs, that no attempt will be made to summarize the literature, or to cover the large numbers of separate compounds, of greater or lesser antihistaminic value, marketed in the same period. I believe it is safe to say that no drug or group of drugs has been accompanied by greater publicity in the lay press. The antibiotic group of drugs would appear to have been promoted in a more ethical manner than the antihistaminics. The reason is not far to seek—it being principally economic. Antibiotics as a rule are administered only following certain diagnostic procedures, and if injudiciously used, may lead to grave results. Antihistaminics, on the other hand, were in certain instances extensively promoted through the lay press and the radio, for the control, or suppression, of such familiar conditions as hay fever or the common cold, where little serious ill-result would likely follow self-medication. As estimates of the numbers of allergic individuals run as high as 10% of the population, competition for this large and permanent group of customers was keen. So much has now been learned, through the field of clinical trial, of the limits of usefulness of these drugs, that it is worth while refreshing our minds with the accumulated experience.

We must remember that the antihistamines were developed as a result of the hypothesis that histamine is the key to the allergic reaction. While histamine can reproduce many of the manifestations of hypersensitivity, it differs from the anaphylactic reaction in certain respects; and while there is a mass of evidence that histamine is involved in the anaphylactic reaction, we are not sure it is the most important single factor.

*An address delivered September 25, 1951, at Montreal, before the Industrial Medical Association of the Province of Quebec.

Canad. M. A. J.
Feb. 1952, vol. 66

Without, however, becoming involved in a discussion of the biochemical and immunological mechanisms of allergy and anaphylaxis, let us turn to some of the clinical conditions in which these drugs are of use. Before proceeding with consideration of the so-called antihistamine drugs, it is well to remind ourselves that adrenalin is one of the most satisfactory physiologic antihistamines – adrenalin dilates bronchioles, constricts peripheral blood vessels; histamine does the reverse.

The group of antihistamine compounds has been used most extensively in seasonal hay fever, or vasomotor rhinitis due to seasonal or non-seasonal inhalants. In these conditions the antihistamines find their greatest fields of usefulness. It is a common observation, to see in a few minutes the sneezing brought under control, the itching and burning of the conjunctivæ relieved, the congestion of the nasal secretions lessened. On the other hand, there are a few instances where even a large dose, and a thorough clinical trial of available compounds, fails to promote any appreciable relief. Why certain patients do not respond is unknown.

Bronchial asthma was the condition for which were held the hopes of greatest subjective relief. Unfortunately, in bronchial asthma the antihistamines have proved almost uniformly disappointing. It is true that sometimes for a short period some relief seems to be provided, but in our experience this, even when it occurs, is evanescent. An exception is in the case of infants and small children; in some instances bronchial asthma in these small patients responds within appreciable limits to the antihistamines, but even here the effect is usually transitory.

In urticaria one can with considerable assurance expect subjective relief from antihistamines. Itching is relieved, partially or completely, and there is a diminution in the extent and severity of the urticaria, which however regresses upon withdrawal of the drug. Angio-œdema does not respond so satisfactorily. Why should these drugs be more efficacious in some than in other allergic diseases? The reason is unknown. It is thought that the antihistamine drug can inactivate the histamine only when both are free in the plasma. The proponents of the histamine theory claim that the origin of the histamine in certain cases is intracellular.

It was natural to apply the antihistamines locally to various surfaces. They are purveyed in ointments, or liquids. In the former medium they have their greatest usefulness in pruritic lesions; but whether the clinical effect is due to any antihistaminic mechanism or to the local anæsthetic effect of the drug, is unknown.

In two conditions these drugs have a useful clinical application, where any possibility of a histamine-antihistamine reaction seems excluded, and where the mode of action is unknown. The first of these is in motion sickness. It was accidentally found that these compounds inhibit or control to a great degree the disagreeable subjective effects of motion sickness. The second is the nausea of pregnancy. How the antihistamines materially suppress this very unpleasant accompaniment of a physiological condition is unknown.

Human nature being what it is, it was inevitable that the drugs should be used in a variety of conditions. It has been said that the pain of dysmenorrhœa is relieved by antihistamines, but gynæcologists generally do not support the suggestion. About two years ago a report was submitted that antihistamines not only control early symptoms of epidemic common colds, but abort or shorten the attack. Unfortunately neither of these submissions has been borne out by subsequent studies. One factor in extending the popularity of the antihistamines is the relatively wide range of safety. Very few deaths have been reported as directly due to their use, and then chiefly in children through accidental and considerable overdosage. Agranulocytosis, at first feared because of the chemical formula, is very rarely encountered.

The principal disadvantage in the use of antihistamines lies in their side effects. In approximate order of importance, these are (1) drowsiness, ranging from actual sleepiness to impairment of power of concentration; (2) sensation of dryness of the throat; (3) muscular inco-ordination; (4) visual effects, probably due to impairment of accommodation; (5) certain antihistamines have been shown to increase the severity and frequency of epileptic seizures, in epilepsy of focal or idiopathic origin.

Individual compounds vary considerably in intensity or mildness of side effects. It is often necessary to try several compounds before finding one which will alleviate symptoms with minimal side effects. It is not uncommon to observe a patient who is stimulated rather than depressed, or who feels no side effects at all from a compound which in someone else induces disagreeable symptoms.

In considering the harmful effects of these drugs, therefore, one is concerned, not so much with the extremely rare deaths due to overdosage or agranulocytosis, as with the effect of these drugs upon our industrial population, and those who drive their own vehicles in traffic. So far as I know, no one ever conducted a survey of traffic or industrial accidents to determine how many of those responsible for the accidents were under the influence of antihistamines. Several such instances have found their way into medical literature, but a great many more may go unrecorded. The relatively minor side effects are not sufficiently publicized. My own practice, when prescribing antihistamines, is to name the known side effects, stressing the important ones of drowsiness and impaired co-ordination. It is wise to try the effect of the drug well in advance of driving a car or truck, or before operating a complicated industrial process. Some individuals

find that if they continue the drug, unpleasant side effects become much less troublesome.

In summary therefore, it may be said, that from a straightforward antihistaminic point of view, these drugs have accomplished less than was hoped for; secondly, they have proved of value in certain conditions where the pharmacological mechanism is unknown; and finally, that their widespread use creates additional problems arising through certain side effects of the drugs—those relating especially to drowsiness and incoordination.

DETERMINATION OF TRUE BLOOD SUGAR USING ANTHRONE*

PAUL GREEN, B.A., M.D. and
EUNICE WADE, B.Sc., R.T.[C.], *Winnipeg*

THE REAGENT described by Dreywood[1] in 1946 has been used in the determination of carbohydrates[2, 3] and also for estimating blood glucose as opposed to the determination of total reducing substances.[4, 5] The advantage of this reagent is that it develops a green colour that is specific for carbohydrate substances. Once the colour has developed, it is stable for several hours and does not tend to fade.

The disadvantages of this method are: (1) It is so sensitive that high dilutions of the test solution must be made before the test can be applied, and errors are therefore multiplied considerably. (2) The reagent contains concentrated sulphuric acid which is dangerous to use, and disposal may present a difficulty. (3) The great disadvantage, however, is that the reagent is very unstable, and deteriorates rapidly on standing. For this reason fresh reagent must be made up at frequent intervals, and permanent calibration charts for photo-electric colorimeters are not possible.

The modification described in this paper overcomes the last two objections, in that the reagent can be constituted as required, and permanent calibration is possible.

PREPARATION OF THE REAGENT TUBES

Anthrone (Paragon of British Drug House) is dissolved in C.P. acetone, so that 1 ml. of the acetone contains 4 mgm. of anthrone. 1 ml. of this solution is pipetted into a glass tube 6 x 125 mm. diameter, and the tubes are placed in a warm bath to evaporate the acetone. These tubes can be made up in large numbers and can be stored away for an indefinite period of time.

METHOD

0.1 ml. of blood is pipetted into 5 ml. of 5% trichloracetic acid, and mixed. After standing about five minutes this is filtered.

Into a prepared reagent tube, place 2 ml. of concentrated sulphuric acid, and gently agitate until the anthrone is dissolved. Take 1 ml. of the filtrate and allow this to flow down the side of the reagent tube and layer on to the surface of the sulphuric acid. Prepare a blank using 5% trichloracetic acid instead of filtrate.

The contents of the tube are now mixed by vigorous side-to-side shaking, and then placed in a boiling water bath for ten minutes. The tubes are then removed and allowed to cool. The contents are poured into the small cuvettes of a Coleman Junior spectrophotometer, and read using a filter of 625 μ, and using the trichloracetic acid blank to set transmittance to 100%.

Calibration.—Calibration charts are set up using glucose solutions of known strength and proceeding as if these were blood.

Reproducibility.—18 tests run on one sample of blood showed a co-efficient of variation of 2.2%.

Recoveries.—With varying amounts of glucose added to blood samples, recovery averaged 98%. Standard percentage error was 7%.

Comparison with standard methods.—A series of blood sugar determinations were made with the anthrone method described, and simultaneous determinations were done using blood deproteinized with zinc hydroxide,[6] and the reducing power of the filtrate determined with Folin-Wu reagent.[7] The colour was read in a Coleman Junior spectrophotometer. It was found that agreement was good, but that the anthrone values tended to be about 5 to 10% lower when glucose content was low. The best agreement was found at glucose levels in the region of 150 mgm. glucose per 100 ml. of blood. Above this level anthrone tended to produce values somewhat larger than the Folin-Wu method, average difference being 5%.

Anthrone can be used to determine true glucose levels of blood. It does not offer any great advantage over existing methods for determination of "true" blood sugar in laboratories where blood sugars are run in quantity. However, in the laboratory where comparatively few blood sugars are determined daily, or where such determinations are only occasionally done this method might be of considerable use.

SUMMARY

A modification is described for the determination of true blood sugar using Dreywood's anthrone reagent. With this method permanent calibrations for colorimeters are possible and the necessity for making fresh reagent daily is overcome.

REFERENCES

1. DREYWOOD, R.: *Ind. & Eng. Chem.* (Anal. Ed.), **18**: 499, 1946.
2. MORRIS, D. L.: *Science*, **107**: 254, 1948.
3. SATTLER, L. AND ZERBAN, F. W.: *Science*, **108**: 207, 1948.
4. DURHAM, W., FAY, BLOOM, W. L., LEWIS, G. T. AND MANDEL, E. E.: *U.S. Public Health Rep.*, **65**: 670, 1950.
5. MOTEGI, K.: *J. Japan Biochem. Soc.*, **21**: 40, 1949; *Chem. Abst.*, **43**: 5819 F.
6. SOMOGYI, M. J.: *J. Biol. Chem.*, **86**: 655, 1939.
7. FOLIN, AND WU, H.: *J. Biol. Chem.*, **41**: 367, 1920.

*Department of Veterans' Affairs, Deer Lodge Hospital, Winnipeg, Man.

Writing in the October issue of *Aeronautics* the chief medical officer of British European Airways remarks that "indigestion and hæmorrhoids are so common among air-crews that they may well come to be regarded as occupational ailments".—*Brit. M. J.*, 2: 1053, 1951.

The Canadian Medical Association Journal

published monthly by
THE CANADIAN MEDICAL ASSOCIATION

Editor: H. E. MACDERMOT, M.D., F.R.C.P.[C.]
Editorial Offices: 3640 UNIVERSITY ST., MONTREAL

(Information regarding contributions and advertising will be found on the second page following the reading material.)

EDITORIAL

HOSPITAL STANDARDIZATION IN CANADA

The accreditation and inspection of hospitals in Canada have been the subject of close and constant attention by our Association. The present circumstances will be referred to later, but first it should be pointed out that our Association through its Department of Hospital Service has for many years performed a valuable function in the approval of hospitals for intern service: the financial support of the Sun Life Assurance Company in this work must always be gratefully remembered.

Under Dr. Harvey Agnew this type of hospital survey was set on a solid foundation, and he has continued to serve as chairman of the committee on approval of hospitals for internship. But this involves only one aspect of hospital accreditation. The general inspection and standardization of our hospitals as regards equipment and organization of the staff has been dependent so far on the good offices of the American College of Surgeons, which has a direct interest in the standards of the hospitals with which so many of its Canadian Fellows are associated. Now, however, the College has withdrawn from this work after a decision made some time ago but not acted on until other arrangements could be made to carry on the inspection.

The feeling that we in Canada should inspect our hospitals ourselves was in evidence even before the American College of Surgeons retired from the field. It is our hope that we may be able to carry on this work but the cost is a very serious difficulty. To inspect hospitals throughout the Dominion adequately would cost something like $75,000 annually; which, incidentally, gives us some idea of the debt of gratitude we owe to the American College of Surgeons for their work in past years.

It is quite evident that it will be necessary to establish in Canada some type of organization representative of all those interested in hospital inspection, such as the Canadian Hospital Council, the Canadian Medical Association, and the Royal College of Physicians and Surgeons of Canada. It is therefore proposed that very early in the year a meeting will be held and representatives of these three bodies will attempt to come to some understanding as to how such an inspection service could be established in Canada.

By mutual consent there was set up in the United States during the past year the machinery of a joint Commission on Accreditation of Hospitals. It is composed of representatives of the American Medical Association, the American Hospital Association, the American College of Physicians and the American College of Surgeons; and the Canadian Medical Association has been invited to take a seat on it. The Executive Committee of the Canadian Medical Association, at its last meeting, decided, after full consideration, to accept this invitation. Dr. Kirk Lyon, who, for the past two years, has been chairman of a special committee of the Association on inspection and standardization of hospitals, has been appointed the Canadian member of this joint commission, and attended its inaugural meeting on December 15. Dr. Lyon reports that officers have been chosen for the Commission, and that the head office will be in Chicago.

This Commission will be a policy making body, which will set up standards for the conduct of the practice of medicine and surgery in hospitals in the United States and Canada. It will carry out no inspection service itself; this will be done by the various organizations which are members of the Commission. For example, the American College of Surgeons will continue to inspect those hospitals which have a cancer treatment centre connected with them; the American Medical Association will continue to approve hospitals in the United States for internship.

The American College of Surgeons is turning over its complete files to this new Commission, and the information thus obtained will be the basis for its work. A full report of all activities to date will be made to General Council of our

Association at the Banff meeting. In the meantime, we are sure that our commissioner will appreciate suggestions from the members of the Association to assist him in carrying out this most important work.

CIVIL DEFENSE HEALTH SERVICES

We publish in this issue a summary of what has been planned as a program in respect to civil defense health services in Canada for the coming year. This program is a first phase of what it is proposed to do eventually, and it is felt that it can and should be completed within the first six months of this year.

The Minister of Health and Welfare, the Hon. Paul Martin, has advised the provincial ministers responsible for civil defense of the details of the program, and is most anxious that the Canadian Medical Association be made fully aware of the extent to which he is relying on the co-operation of our members and of other key groups in the communities for the success of this program.

We cannot too strongly emphasize the importance of this planning and would especially dwell on the vital part which all medical men are being asked to play in the civil defense of the country.

Editorial Comments

THE AUSTRALASIAN MEDICAL CONGRESS (B.M.A.) EIGHTH SESSION

Our Association has received an invitation from the Federal Council of the British Medical Association in Australia to nominate a representative to attend the Australasian Medical Congress (B.M.A.) Eighth Session, to be held in Melbourne, Victoria, August 22 to 30, 1952. No nomination has been made, but if any member of our Association is contemplating a trip to Australia at that time, and would care to act as our representative at this Congress, please notify the General Secretary, 135 St. Clair Avenue W., Toronto, in order that the name may be sent on.

PHARMACOPŒA INTERNATIONALIS

A significant advance in international co-operation has been made in the publication of an international pharmacopœia. It is a contribution towards the fulfillment of the first objective of the World Health Organization—the attainment by all peoples of the highest possible level of health. There is obviously a need for a uniform system of nomenclature, under which drugs of the same strength and composition would be designated. The present variation between countries is not only an embarrassment and even danger to travellers, but hinders the spread of medical and pharmaceutical knowledge. Modern developments in travel heighten the need for this type of uniformity.

Apparently an international pharmacopœia has been projected for well over a century. At first attention was paid to only the most potent drugs, and international agreements were reached which eventually led to the setting up of an international organization for the unification of pharmacopœias: The League of Nations acted as the secretariat.

After the war, in 1947, the work begun by the Health Organization of the League was taken over by the World Health Organization, and now, four years later their labours have resulted in the first volume of the Pharmacopœa Internationalis. At present, English and French editions are ready, and a Spanish edition is being prepared.

The International Pharmacopœia has been formally recommended by the World Health Assembly for acceptance by its Member States, in the hope that it will be adopted as a whole as their official pharmacopœia. This would aid greatly in unifying drug standards throughout the world. It is available in Canada through The Ryerson Press, 299 Queen St. West, Toronto.

AMBITION FOR THE STATE.—I use the word "ambition" after consideration. The true physician is a socialist and loyalty to such a creed must make him ambitious. He is primarily a law-abiding citizen and supporter of regularly constituted authority. He is, moreover, a practical part of the state when by his skill, he diminishes the number of the non-working days of its citizens and proportionally increases the annual return.—F. Brodie, *Canad. M. A. J.*, **11**: 238, 1921.

Canad. M. A. J.
Feb. 1952, vol. 66

MEN AND BOOKS

THE LOT OF FEW MEN*

J. R. D. BAYNE, M.D., *Montreal*

[*There is really very little of a strictly medical nature in this paper. The central figure was admitted to hospital and died there. That was the end of a struggle against tragedy. But the story is well told and has its historical interest.*—EDITOR.]

THE ROYAL VICTORIA HOSPITAL was opened in 1893. At 1.00 p.m. on June 19, 1894 there was admitted case No. 699—a man of 35 brought from the St. Vincent de Paul Penitentiary in the last stages of disease. His temperature was 101°, pulse 150, respiratory rate 42, and the diagnosis phthisis. He was given whiskey and milk, and hypodermic injections of strychnine gr. 1/30 and ether 10 min. but died within a few hours. There is no more information in the chart. The Records Department apparently had the same troubles then as it has today! Although this patient gave no history, if he could he would have told a strange tale.

The Eastern Townships of the Province of Quebec form a triangle bounded by the St. Lawrence River to the north, Vermont and New Hampshire to the south and the state of Maine to the east. They were settled for the most part early in the last century by the so-called United Empire Loyalists, but large tracts were bought up for disposal by the British-American Land Company. This company in 1838 and 1841 sponsored and encouraged the immigration of a number of Scots families to the untouched lands about the headwaters of the St. Francis and Chaudiere Rivers. Some of the land is undulating, some is rocky and mountainous, it was all at that time densely wooded. These people had no knowledge of what faced them; the long trek by wood road from Quebec with women and children, the oppressive heat of summer with its torment of flies, the bitter cold of the winter to follow. For the first year the Land Company supplied them with oatmeal which they paid for by grubbing out a track from Bury to Lingwick, still known as the "Scotch Road". The apparently endless enmity of a strange and harsh new country bred iron into their souls and instilled in them a deep love of their hard-won homesteads.

Murdo Morrison was among these settlers. He made his home near Lake Megantic; established his farm and reared his family. He lacked formal education, but spent his Sundays painstakingly and thoughtfully reading his Bible, and he brought up his children in the strict Celtic tradition.

Donald was the youngest child and the last to leave home and it was understood he would inherit the farm. His father had however incurred some debts which he covered by a mortgage, and so it was that Donald went out west to work for several years. At regular intervals he sent money home to pay the mortgage.

In such a closely knit community where few could read or write, the spoken word was taken as a guarantee; hence Murdo Morrison paid off the mortgage but asked for no receipts. After several years the payments were nearly complete when, to their surprise, the family were told to pay the whole sum or lose their home. Arguments were of no avail against the bald facts, there were no receipts. Donald put the matter in a lawyer's hands who was quite unscrupulous in his expenditures. Donald lost the case and the rest of his savings. He became embittered with the law and made public statements that future tenants would regret their choice if they occupied the farm. However it was taken by a French Canadian named Duquette. A few days later a bullet crashed through a window, and then one night the barn burned down; and on these grounds a warrant was issued by Joseph H. Morin, J.P. of Sweetsburg for the arrest of Donald Morrison. However the people generally were sympathetic to the young man, and few were brave enough to risk an armed encounter with him.

After several months of fruitless search, the authorities enlisted the help of Lucias "Jack" Warren, a whiskey smuggler from the United States, who bragged that he would bring in Morrison without delay, and gave weight to his statements with public target practice in the village. Morrison avoided him, and only came in to the village when he heard Warren was away.

On June 22, 1887, Warren had announced that he would leave the town of Megantic for the day, but changed his mind and spent the early afternoon drinking beer in Nelson Leet's Hotel. At 3.00 p.m. Morrison came sauntering down the street with a cane in his right hand. Warren went out to meet him. Morrison called out, "Keep clear." Warren came on and apparently drew his revolver. When they were about six feet apart Morrison fired and Warren fell. Morrison quietly walked away. Dr. Millette reported later that the bullet had cut the carotid artery and passed through the spine.

With two warrants out for his arrest and later a reward of $3,000 offered for his capture, Morrison continued to elude his enemies. Reinforcements were brought from Montreal and Quebec until several hundred men were scattered between Megantic, Spring Hill and Scotstown on the railway, and Stornoway, Gould and Red Mountain to the north. The people, with an old clannish loyalty, fed him, sheltered him and protected him. With a cool daring which repeatedly fooled his pursuers he moved from place to place in broad daylight, often passing the police on

*Read before the Section of Historical Medicine at the 82nd Annual Convention, Canadian Medical Association, Montreal, June 20, 1951.

the road with a casual greeting. One day a party of officers were sitting by a roadside admiring the view when they heard a cheery call from a young man who had just appeared round a sharp bend in the road. As they chatted one of the officers said, "You look like Donald Morrison". The young man laughed heartily and said if he had been Morrison he would have ducked into the brush when he saw them. With this he went on his way. After some argument about his identity one of the officers went on to the next corner where he could see up the road for a long distance. The young man had vanished. It was Morrison indeed. He had realized when he came suddenly on the search party that to run away would provoke a volley of bullets after him.

At times he would watch a house being searched from the window of a neighbouring building while he ate his lunch, or would wait until a whole village had been explored and then slip in to spend several days there in comparative safety. As the police learned of these exploits they made wholesale arrests, but the people went unprotestingly to jail and were soon released again. They would leave food and clothing near an open door for Morrison to take if he needed them. Once he was caught unawares at a dance and dove under a couch which the women sat upon, cautioning him in Gaelic while they smiled innocently at the search party.

But as the search grew more intense Morrison could not have remained free without more active help from the community. How active that was is revealed by Peter Spanyardt, a reporter from the *Montreal Star,* in an account of an interview he had with Morrison when the hunt was at its peak. He had tried by various means to meet Morrison without success, when finally he received a cryptic message telling him to take the train from Megantic as if going home, but to get off at the next stop and go to Sandy Beach. He did this, and waited at the rendezvous for two hours smoking cigarettes until a tall distinguished gentleman with black eyes and a black beard drove up in a buggy. He informed Spanyardt politely that if they were caught by the police he would shoot him and then himself. With this comforting thought they set off. At nearly every mile of the route a man would appear at the roadside and mutter a few words in Gaelic; apparently they were Morrison's guard. After lunching at Stornoway, they drove about until evening when they approached a big lonely house standing in a field and there he met Morrison. He was tall, gaunt, sandy-haired and blue-eyed, with a friendly smile and a firm handshake that gave little evidence of fear or anxiety. He told his story and asked Spanyardt to report it impartially and to "tell the world how I have been treated, and how I have acted in the face of persecution". After the interview Spanyardt saw a number of men coming away from the house; the upper storey had been filled with silent sentinels.

Friends tried to persuade Morrison to give in and they would use the reward to pay for his defence; others begged him to go back out west, but he refused. A truce was arranged with the authorities, giving Morrison several days of freedom before and after the meeting. However the discussions were fruitless; Morrison was adamant, he would only give in if the farm were restored to his parents. So the struggle went on for nearly two years.

Then on Good Friday of 1889 it was understood by Morrison's friends that another truce was in force. If it was a trick is not known. The outlaw went to his parents near Marsden to change his clothing. A storm was brewing, the clouds hung low and the wind was rising. The house was constantly watched. Morrison was seen to enter. As he came out he was attacked and tried to defend himself. He was shot in the thigh and captured.

His trial aroused tremendous local interest. It began in Sherbrooke on Oct. 1, 1889 before Justices Wurtele of Montreal and Brooks of Sherbrooke and lasted nine days. The defence attorney was a Montreal lawyer then coming into prominence, Mr. J. N. Greenshields. It was established by witnesses that Morrison had been a friendly, kindly, trustworthy youth, admired and respected by all in the community. The fact that Warren was hardly a fit person to act as agent of the law provided grounds for argument, but there could be no question that Morrison had killed him. He was found guilty of manslaughter, but the jury recommended clemency. For some reason not clearly understood, he was sentenced to 18 years in the penitentiary. Morrison refused to appeal.

In the penitentiary he became the victim of tuberculosis. His friends continued to work for his release and finally a petition was presented to the Governor-General. At last they were successful and Morrison was pardoned—the day before his death.

There was never any doubt that Morrison had killed Lucias Warren on the afternoon of June 22, 1887, or that eventually he would have to face the accusation. It is interesting to speculate on why he refused either to surrender his case to the law, or to return to the west. Family and personal pride certainly played a part, but it is probable that the young man believed he represented a protest against an old evil—the ability of unscrupulous persons, acting within the law in a sophisticated society, to confiscate a family homestead and birthright.

And the neighbours defended and shielded him against the law as long as he wished to remain an outlaw. Although they encouraged him to give in, they apparently recognized an inherent right for any man to seek to establish justice by his own actions. Such an attitude is not uncommon in a closely knit pioneering community on the outskirts of civilization, but may seem an anachronism when we realize this happened only sixty years ago and less than 200 miles from Montreal. And today this sense of

Canad. M. A. J.
Feb. 1952, vol. 66

individual freedom still survives in the Townships, although it is the lot of few men to give such forceful expression to it.

REFERENCES

1. KIDD, H. G.: The Megantic Outlaw, Best Printing Co., Toronto, 1948.
2. SPANYARDT, P.: The Outlaw of Megantic, *Wide World*, March, 1912.
3. Records, Royal Victoria Hospital, Montreal.

MEDICO-LEGAL

COMPETENCE

T. L. FISHER, M.D.,* *Ottawa*

WHEN the Canadian Medical Protective Association finds it must provide help for members because of legal action against them on the grounds of malpractice or negligence in a professional sense, one question the Association has to ask itself is whether or not the doctor was competent for the work he undertook. Or, if it seems the doctor was not competent, were the circumstances such as to have justified undertaking work for which he obviously was ill equipped by training or ability? This question, which must be decided often by the Association, prompts some thought about the meaning of the word "competence" as it is applied to the work done by doctors. When a doctor may be deemed to have been competent the problem then arises about how best that competence may be demonstrated so that it will become apparent to the person or persons who must judge the doctor. The two questions to be discussed, therefore, are: When is a doctor competent? How will his degree of competence be judged?

When is a doctor competent? Every doctor decides this question—many times—every day. Whether or not he knows it, every time a doctor accepts responsibility for the treatment of a patient he has decided in his own mind that he is competent to handle that case. With some exceptions to be mentioned later it thus is apparent that by his actions a doctor is continually laying claim to various degrees of competence. The general practitioner, doing general work and referring major surgery or serious medical cases or complicated obstetrics, for example, says that his competence extends over the general field but not into some particular fields. The specialist, on the other hand, by accepting only one type of work and by being willing to accept the most serious and involved cases in that specialty, by refusing work outside his specialty says in effect that he has acquired special skill in his chosen field and judges himself competent for this special work. It should be noted that the doctor who simply limits his work to one field obstetrics, for example, says in effect that these things are within his competence and that the patient may reasonably expect as good a result as would have been expected from any other similarly situated doctor.

Thus, the first person, as well as the most immay not, therefore, be competent as a specialist in the one field. Similarly the general practitioner who, in addition to his usual work, accepts responsibility for major surgery or for complicated portant person, to decide on the doctor's competence is the doctor himself. His decision should have been reached on the basis of the training he has received, on the amount of skill he has acquired, the amount of experience he has had and his own estimate of his abilities as he can judge them in terms of other men doing the same kind of practice.

If legal action be brought against the doctor on the grounds that he was incompetent, what will be the basis of judgment of a court? The court will want to know two things. It will try to learn what the doctor said or implied he could do. Once having learnt that, the court will know—from the doctor himself, remember—the basis on which he should be judged. It cannot be emphasized too strongly that most often the doctor, by his actions, labels himself and says how he will be judged.

The second thing the court will want to know is by what right the doctor made his claim to competence in the given circumstances. A number of things will be taken into consideration in this decision. It will be necessary for the doctor to state his training. If the doctor's formal training happens not to be sufficient to make demonstrably apparent his right to accept responsibility for the case in question he may be able to show that he had acquired sufficient knowledge by experience to fit him for the duty. He might then be asked, as an evidence of his skill, about the number of similar cases he had handled, what complications there had been and what his results had been.

Thus the first main questions would be decided, the doctor's own estimate of his ability and whether or not his training or experience allowed the same estimate by the court.

The circumstances of the individual case, the work done, the methods employed and the result obtained then remain for consideration. When a court has heard of these things from the doctor it very often tries to obtain verification. This may be obtained from other men doing work similar to that done by the doctor being judged. These men may be asked whether, in their opinion as a result of their own knowledge and experience, the work was done competently, whether in spite of competent work similar ill results or complications have occurred in their own work, whether the ill results or complications can be avoided or are unavoidable. By comparing the work done by other doctors and the doctor being judged it may be possible to decide about the competence of the doctor against whom the claim has been made.

*Secretary-Treasurer, Canadian Medical Protective Association.

While the circumstances of any case may make it exceptional there are two exceptions to the above general remarks that should be mentioned. Under emergency circumstances a doctor without special training in a particular field would be forgiven much if he were the only doctor available as long as he did all he could until some doctor more competent were available. Similarly, the only doctor in an isolated community is forced by circumstances to do the best he can with many cases which, by choice, he would not treat if anyone else were available. The courts give due consideration to these influencing circumstances. The decision as to the culpability of a doctor in a given case is much influenced by the necessity for his services and by the availability of assistance. Whether or not a hospital is available is of great importance and, if there be one, its size and equipment. In centres where other doctors are practising the availability of assistants is important, as is the presence of other doctors of equal or greater competence to act as consultants, and the presence or absence of specially trained doctors to whom more difficult work can and should be referred. Under these latter circumstances a doctor would be hard put to justify having done work which could have been done better by more competent doctors whose presence made them easily available. When all these things have been weighed there is yet another important consideration. Even in his own sphere no doctor is expected to provide perfect service. In the judgment of Lamphier v. Phillips (1838) 8 CMP. 465, Tindal C. J. it was said:

"Every person who enters into a learned profession undertakes to bring to the exercise of it a reasonable degree of care and skill. He does not undertake, if he is an attorney, that at all events you shall gain your case, nor does a surgeon undertake that he will perform a cure; nor does he undertake to use the highest possible degree of skill. There may be persons who have higher education and greater advantages than he has, but he undertakes to bring a fair, reasonable and competent degree of skill."

A case recently brought to the attention of the Canadian Medical Protective Association illustrates some of these points and the penalty that may be exacted of a doctor who undertakes work for which he is incompetent. Some time ago a doctor undertook the repair of a cystocœle which was complicated by the fact that a pessary had been worn for twelve years without having been changed. The surgery therefore might have been expected to be difficult and it proved to be so because of excessive bleeding. Hæmorrhage was controlled with difficulty and some oxycel packs were left in place. After an apparently normal postoperative course the patient claimed persistent leukorrhœa. After this had continued some time the patient was referred for consultation and a few days after the consultation the first piece of gauze was extruded from the vagina. At varying times afterward three more pieces were recovered. When the patient's health was restored she made a claim for $2,300.00 for out-of-pocket expenses and damages.

Various discussions were held with legal and medical advisers to learn the probability of a successful defence. Expert medical witnesses felt there was no evidence which would justify what had happened and there was no possibility of establishing an unforeseen emergency which would justify the leaving of gauze wipes in the operative area. One of the experts felt the doctor's judgment had been seriously at fault in operating when he did and felt that fact militated against a hope of successful defence. Therefore the doctor was forced to settle the case. By accepting responsibility for surgery which his own medical confrères felt was outside the scope of his competence the doctor denied himself the opportunity of defending himself.

MISCELLANY

THE DISCOVERY OF ANÆSTHESIA

Date	*Anæsthetist*	*Surgeon*	*Patient*	*Anæsthetic*	*Comment*
1824	H. Hickman	(Experiments on animals)		Nitrous oxide	
1842	C. W. Long	Long	Jas. Venable	Ether	
1844	G. Colton	—. Riggs	Horace Wells (tooth)	Nitrous oxide	"A new era in tooth pulling"
1846	W. T. Morton	Morton	Eben Frost (tooth)	Ether	
1846 Oct.	W. T. Morton	J. C. Warren	Gilbert Abbott	Ether	"Gentlemen this is no humbug"
1846 Dec.	P. Squire	R. Liston	Frederick Churchill	Ether	"This Yankee dodge beats mesmerism hollow"
1847	J. Y. Simpson	J. Miller	"A Highland Boy"	Chloroform	

From: "The Patient: A neglected Factor in the History of Medicine," Guthrie, D., *Proc. Roy. Soc. Med.*, 28: 490: 1945.

Canad. M. A. J.
Feb. 1952, vol. 66

ASSOCIATION NOTES

INCOME TAX INFORMATION

INDIVIDUALS whose income—(a) is derived from carrying on a business or profession (other than farming); (b) is derived from investments; or (c) is more than 25% derived from sources other than salary or wages, are required to pay their estimated tax by quarterly installments during such year. Each payment must be sent in with Installment Remittance Form T. 7-B Individuals. Any balance of tax is payable with interest with the T-1 General return which is due to be filed on or before April 30 of the succeeding year.

The following timetable indicates the returns required.

A. Doctors NOT receiving salaries amounting to ¾ of income:

Date Due	Forms to be Used
March 31	T.7-B Individuals
April 30	T.1-General (Note: Only doctors deriving their full professional income from salaries may use Form T.1 Short.)
June 30	T.7-B Individuals
September 30	T.7-B Individuals
December 31	T.7-B Individuals

B. Doctors receiving salaries amounting to ¾ or more of income:

Date Due	Forms to be Used
April 30	T.1-General (Note: Doctors deriving their full professional income from salaries may use Form T.1 Short.)

Whenever status is changed* T.D.-1.

Doctors who pay salaries to their own employees are required to send in Form T.-4 by the end of February each year.

DOMINION INCOME TAX RETURNS BY MEMBERS OF THE MEDICAL PROFESSION

As a matter of guidance to the medical profession and to bring about a greater uniformity in the data to be furnished to the Taxation Division of the Department of National Revenue in the annual Income Tax Returns to be filed, the following matters are set out:

INCOME

1. There should be maintained by the doctor an accurate record of income received, both as fees from his profession and by way of investment income. The record should be clear and capable of being readily checked against the return filed. It may be maintained on cards or in books kept for the purpose.

*With respect to new employer, marital status, dependents.

EXPENSES

2. Under the heading of expenses the following accounts should be maintained and records supported by vouchers kept available for checking purposes:

(a) Medical, surgical and like supplies;

(b) Office help, nurse, maid and bookkeeper; laundry and malpractice insurance premiums. (It is to be noted that the Income Tax Act does not allow as a deduction a salary paid by a husband to a wife or vice versa. Such amount, if paid, is to be added back to the income);

(c) Telephone expenses;

(d) Assistants' fees; The names and addresses of the assistants to whom fees are paid should be furnished. This information is to be given each year on Income Tax form known as Form T.4, obtainable from your District Income Tax Office;

(e) Rentals paid; The name and address of the owner (preferably) or agent of the rented premises should be furnished (see (i));

(f) Postage and stationery;

(g) Depreciation; A description of the treatment of depreciation may be found on page four of the Income Tax Return form T.1 General under the Part XI Method.

The method of computing depreciation for tax purposes is the same as that used last year and you should have no difficulty if you have a copy of last year's return available.

Simply carry forward the balance remaining in each class after deducting last year's allowance. Add to this figure the cost of any new equipment purchased and deduct the proceeds from any disposal of property in each class. The rate you wish to use not exceeding the maximum rate (see below) is applied to this new balance for each class to obtain the depreciation you may claim this year.

The schedule on page four of the Income Tax Return is reproduced below for your information. Column (6) does not apply to doctors, the other columns are self-explanatory.

The maximum rates for the classes of equipment most used by doctors follow:

Capital item	*Class*	*Annual maximum depreciation*
Medical equipment		
(a) Instruments costing over $50 each and medical apparatus of every type	8	20%
(b) Instruments under $50 each	12	100%
Office furniture and equipment	8	20%
Motor car	10	30%
Building (Residence used both as dwelling and office)	3	5%

Instruments costing less than $50.00 each belong in class 12 and have a maximum allowance rate of 100%. They should not be included in expenses but should be recorded as additions in column 3 of the schedule.

Where a doctor practises from a house which he owns and resides in, the allowance may be claimed as above on a portion of the cost of the residence, excluding land. For example if the residence were a brick building costing $12,000 and one-third of the space were used for the office, the doctor would use $4,000 as the business portion of the cost and apply the building rate of 5% to determine the maximum depreciation allowable in the first year.

For further information on the subject you may refer to the Regulations or you may consult your District Income Tax Office.

SCHEDULE

(1) Class number	(2) Undepreciated capital cost at beginning of 1951 (Col. 10 of 1950 return)	(3) Cost of additions during 1951	(4) Proceeds from disposals during 1951	(5) Undepreciated capital cost before 1951 allowance (Col. 2 plus 3, less 4)	(6) Net deferred assets	(7) Amount on which 1951 allowance is calculated (Col. 5 less Col. 6)	(8) Rate %	(9) Capital cost allowance for 1951	(10) Undepreciated capital cost less deferred assets (Col 7 less Col. 9)

(h) Automobile expense; (One Car). This account will include cost of license, oil, gasoline, grease, insurance, garage charges and repairs;

The capital cost allowance is restricted to the car used in professional practice and does not apply to cars for personal use.

Only that portion of the total automobile expense incurred in earning the income from the practice may be claimed as an expense and therefore the total expense must be reduced by the portion applicable to your personal use.

The mileage rate permitted in years prior to 1950 may no longer be used to estimate the automobile expenses.

(i) Proportional expenses of doctors practising from their residence: (a) Owned by the doctor: Where a doctor practises from a house which he owns and as well resides in, a proportionate allowance of house expenses will be given for the study, laboratory, office and waiting room space, on the basis that this space bears to the total space of the residence. The charges cover taxes, light, heat, insurance, repairs, capital cost allowance, and interest on mortgage (name and address of mortgagee to be stated); (b) Rented by the doctor: Only the rent and other expenses borne by the doctor such as heat and light will be apportioned inasmuch as the owner takes care of other expenses.

The above allowances will not exceed one-third of the total house expenses or rental unless it can be shown that a greater allowance should be made for professional purposes.

(j) Sundry expenses (not otherwise classified).—The expenses charged to this account should be capable of analysis and supported by records.

Claims for donations paid to charitable organizations will be allowed up to 10% of the net income upon submission of receipts to your Income Tax Office. This is provided for in the Act.

The annual dues paid to governing bodies under which authority to practice is issued and membership association fees, to be recorded on the return, will be admitted as a charge. Initiation fees and the cost of attending postgraduate courses will not be allowed.

(k) Carrying charges: The charges for interest paid on money borrowed against securities pledged as collateral security may only be charged against the income from investments and not against professional income.

(l) Business tax will be allowed as an expense, but Dominion, Provincial or Municipal income tax will not be allowed.

CONVENTION EXPENSES

"Effective January 1, 1948, the reasonable expenses incurred by members of the medical profession in attending the following Medical Conventions will be admitted for Income Tax purposes against income from professional fees:

1. One Convention per year of the Canadian Medical Association.

2. One Convention per year of either a Provincial Medical Association or a Provincial Division of the Canadian Medical Association.

3. One Convention per year of a Medical Society or Association of Specialists in Canada or the United States of America.

The expenses to be allowed must be reasonable and must be properly substantiated; *e.g.*, the taxpayer should show (1) dates of the Convention; (2) the number of days present, with proof of claim supported by a certificate of attendance issued by the organization sponsoring the meetings; (3) the expenses incurred, segregating between (a) transportation expenses, (b) meals and (c) hotel expenses, for which vouchers should be obtained and kept available for inspection.

None of the above expenses will be allowed against income received by way of salary since such deductions are expressly disallowed by statute."

PROFESSIONAL MEN UNDER SALARY CONTRACT

The employees' annual contribution to an approved Pension Plan and alimony payments may be deducted from salary income.

Amendments to the Income Tax Act, introduced in 1951 and made retroactive to the beginning of the calendar year 1951, provide for the deduction of certain expenses from salary income.

The allowable expenses include travelling expenses, annual professional membership dues, office rent, salary to an assistant or substitute and supplies consumed directly in the performance of the duties of employment.

The annual registration fee of the Provincial medical licensing authority would be allowable

Canad. M. A. J.
Feb. 1952, vol. 66

if paid by the doctor himself.

Certain conditions are attached to the allowance of the expenses and without trying to recite the exact provisions of the law the main points are:

(a) That the expenses must have been incurred in the performance of the duties of the office or employment.

(b) That the employee is required, under the contract of employment, to pay the expenses.

(c) To claim travelling expenses the employee must be ordinarily required to carry on the duties of his employment away from his employer's place of business. Travelling between the doctor's home and his office is not included.

Where the travelling expenses are allowable under these provisions, depreciation may be claimed on the automobile used for this purpose but no other claim for depreciation may be made.

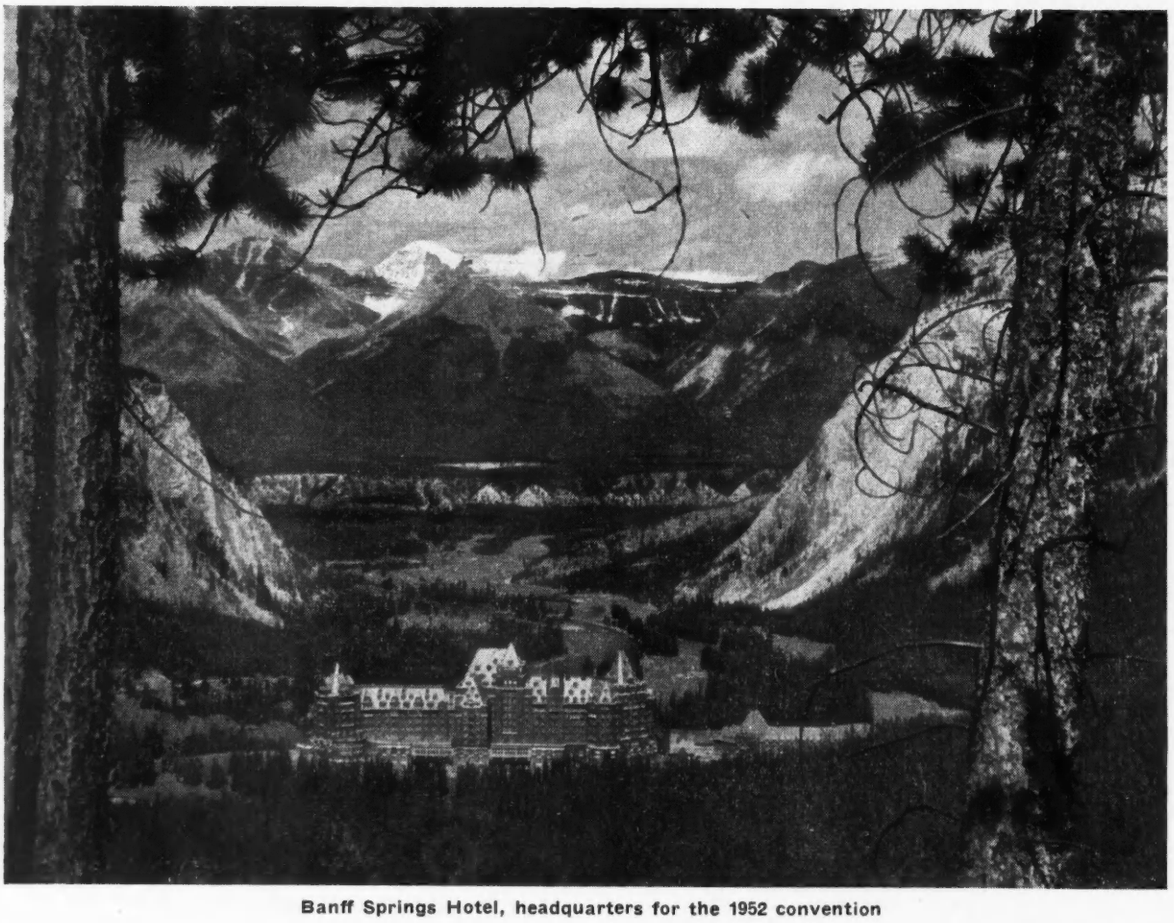
INCOME FROM A PARTNERSHIP

Additional expenses incurred by a partner, but not charged to the partnership, may be claimed as a deduction from the partner's share of income. However, the partner must be in a position to substantiate these expenses, to show why they were not charged directly to the partnership and that they were necessarily laid out to earn the partnership income.

THE ANNUAL MEETING IN BANFF, JUNE 9 TO 13, 1952

THE 1952 CONVENTION of the Canadian Medical Association will be held in Banff, Alberta in June. Headquarters for the Convention will be the beautiful Banff Springs Hotel. Accommodation will also be available at the Chateau at Lake Louise, a distance of 20 miles way, on a beautiful hard surfaced mountain highway. Transportation between these two points will be fast, efficient and frequent.

To those of you who will be returning to Banff, many changes will be in evidence. Included among these will be new scenic drives and trips radiating from Banff in all directions. To those of you whose first visit to Banff will



Banff Springs Hotel, headquarters for the 1952 convention

(Courtesy of Canadian Pacific Railway Company)

be in 1952, a most wonderful holiday spent in a town nestled in beautiful mountains and boasting many of the world's finest excursions lies ahead of you. The accompanying picture of the Banff Springs Hotel cannot do justification to its beauty and grandeur. This Hotel is situated on the banks of the Bow River and stretching from its portals is one of the world's finest golf courses.

It is hoped that many of the doctors and their wives who plan on attending the Convention will also include a few extra days in their itinerary so that the full beauty and grandeur of this mountain resort may be appreciated. Trips to Lake Louise, the Yoho National Park, Columbia Icefields, Jasper, Kootenay National Park and the West coast can easily be arranged for, either prior to your visit to Banff or during Convention Week.

TO THE LADIES

Plans for the entertainment of women guests at the Convention are in progress and it is hoped that a record number of wives will accompany their husbands to the 1952 convention in Banff in June.

Scenic excursions through the mountains by car or bus, by boat, even by "chair lift", will give visitors the chance to see the majestic Rockies in all their variety. The world's most beautiful golf course, stretching along the Bow River below the Banff Springs Hotel, will be the site of the women's golf competitions, and the golf committee hopes that all ten provinces will be represented in the contests. Swimming, riding, canoeing, a luncheon at wonderful Lake Louise, a glimpse at an Alpine meadow, tea on top of a mountain, are all listed as "possibilities" and the entertainment committees are finding it difficult to decide what to leave out, since there won't be time for everything.

For parents who plan to bring along the children, a special committee will make arrangements for children's entertainment so that the parents may be free to take part in convention activities.

The doctor's wives in Alberta are hoping that they will be able to renew old friendships and make many new ones during the convention and promise their visitors a real old-time Western welcome.

J. O. BAKER,
Secretary, Publicity Committtee

ERRATUM

The paper by Dr. R. A. Chaplin on "Spinal Analgesia with Hypobaric Pontocaine for Cæsarean Section" in the January issue, page 32, shows the dose of atropine as "gr. 1/50". This was a printer's error and should read "gr. 1/150".

EXECUTIVE COMMITTEE MEETING, TORONTO NOVEMBER 26 - 27, 1951

[*It is not possible to publish a full account of the proceedings of each meeting of the Executive Committee But it is felt that the discussions on these occasions often contain extremely interesting material, which might profitably be summarized for our members.*

The following extracts from the meeting on November 26-27, 1951, are presented.]

TREASURER'S REPORT

In spite of probable rise in revenue for the year 1952 it is expected that expenditures will probably exceed revenue by some $11,560.00. The main items responsible for this are increased costs in the printing of the *Journal;* higher travel expenses; and the plan to take an active part in the standardization of hospitals.

STANDARDIZATION OF HOSPITALS

(This subject has been referred to editorially; it is still far too soon to more than refer to some of its various aspects.)

Dr. Kirk Lyon, chairman of the committee on standardization, presented from his committee a resolution to the effect (a) that we should accept an invitation to take a seat in the Joint Committee on Accreditation of Hospitals which has been set up in the United States. (b) That a joint conference representing the hospital field and the medical profession in Canada be held to explore means of setting up an inspection program and its necessary budget. This resolution was approved by the Executive.

In discussion it was shown that the cost of a seat on this Joint Committee would be $3,500.00, which is 1/20 of the budget of $70,000 set for the commission. In addition there would be a deposit for the first year by each organization of $1,750.00. The total then for the first year would be $5,250.00.

What would we gain by this representation on the Commission? Dr. Lyon felt there would be great advantage in being part of a body whose experience in hospital inspection would be freely available to us. This commission would do no inspection itself. The American College of Surgeons would continue to inspect hospitals where there was a cancer centre, in Canada as well as the States. But all other hospital inspection would be left to the component members of the commission.

We would learn what was going on in other hospitals and could set up comparable standards to facilitate the interchange of doctors, students and nurses.

Dr. Scriver pointed out that whilst we would only be taxed for one seat on the commission of twenty members, we would still have the Canadian representation on the American College of Surgeons and American College of Physicians.

In answer to a question, Dr. Lyon said that he did not think that the commission was particularly interested in graduate education.

Again, our joining the commission would not force us into inspection work. But there would be no point in our joining unless at some time in the future we undertook our own inspection.

The cost of inspection was shown to be very considerable. No exact figures are yet available, but $75,000 is a possible minimum annual cost. The inspection would start with hospitals of 25 beds and over, and would include all types. The money would have to be sought from various sources. The participation of governments was suggested, as well as that of interested bodies such as the Royal College of Physicians and Surgeons of Canada, the Canadian Hospital Council and the Canadian Catholic Hospital Association.

In the discussion it was apparent that the cost of inspection might be so great that our Association should

not commit itself to sharing it without first having some more definite idea of what it would be. Eventually it was decided that assistance from the C.M.A. to the project for one year, including membership on the commission would be limited to $10,000.00.

SECTION OF GENERAL PRACTICE

A progress report dealt with certain resolutions relating to general practice which had been passed to the Executive Committee by General Council.

(a) It had been decided to budget for the expenses of the Section of General Practice, and this was now implemented by including in the 1952 budget the sum of $2,000.00 for the Section.

(b) Council had approved of the desire of the Section to establish a department of general practice in hospitals large enough to be departmentalized.

It was suggested that the Section itself deal with the implementation of this proposal, and this was in course of being carried out.

(c) The problem of formulating the by-laws of the Section is an important and difficult one, and is still being discussed.

RE MEDICO-LAY ORGANIZATIONS

A committee had been appointed to study the matter of national appeals for funds by medico-lay organizations, and to make recommendations as to whether these

---

APPLICATION FOR ACCOMMODATION
CANADIAN MEDICAL ASSOCIATION
Banff, Alberta, June 9 to 13, 1952.

Mail this form direct to:
Dr. A. E. Wilson,
904 Greyhound Building,
Calgary, Alberta.

Please make the following reservation for C.M.A. Convention: ☐ Single. ☐ Double. ☐ Twin beds. ☐ Suites.

First choice. Second choice.

at Hotel .....

Cabin .....

Please include names of all persons who will occupy rooms. (PLEASE PRINT).

Name. Address. City. Province or State.

.....

.....

.....

Arriving Banff .....at.....A.M. P.M.....Date of Departure .....

☐ Train ☐ Car ☐ Plane

PLEASE RESERVE EARLY:

This application is submitted by me as:
☐ Member of Executive Committee. ☐ Member C.M.A.
☐ Delegate to General Council. ☐ Visiting Doctor.
☐ Contributor to Scientific Program. ☐ Exhibitor.
☐ Member Affiliated Society (Name .....)

Send Confirmation to Doctor .....
(PLEASE PRINT)

....
(City) (Prov. or State)

The following accommodation will be available.

	Single	Double	Twin Beds	Suites
Banff Springs Hotel / Chateau Lake Louise	$16.50 per day	$13.50 per person, per day, two to a room		American Plan

Cabins (limited number) $8.00 to $18.00 per day

Additional accommodation will be available at first class hotels, *i.e.*, King Edward and Mount Royal Hotels at reasonable rates.

Note: DEPLANING POINT FOR BANFF IS CALGARY.

Please Note:

(1) Accommodation at Banff Springs Hotel and Chateau Lake Louise will be considered as one hotel. There will be hourly bus service between Chateau Lake Louise and Banff Springs Hotel.

(2) Single reservations will be assigned to twin bedded rooms for occupancy by two persons, if necessary.

PLEASE CANCEL IMMEDIATELY IF YOUR PLANS CHANGE.

should receive the endorsation of our Association or not. The committee reported that it seemed desirable to establish some form of screening body to check up on these appeals, but that our Association should not be that body. Matters of this nature seemed to be within the Provincial orbit, and should be dealt with provincially.

It was judged wise to seek legal opinion as to the relative jurisdiction of the Dominion and the Provinces in this matter.

THE WORLD MEDICAL ASSOCIATION

A long and detailed report of the Proceedings of the Fifth annual meeting of the World Medical Association was laid before the executive committee. Reference is made to this in special comment by Dr. Norman Gosse, who attended this convention, and more will be said of it from time to time.

At the moment it will be enough to say that the executive appointed a sub-committee to deal with certain resolutions set forth in the report of the convention.

In the opinion of this sub-committee, and this was heartily concurred in by the Executive, it is in the best interests of the medical profession that the Canadian Medical Association continue to co-operate with the World Medical Association, and through it, with the World Health Organization.

TRANS-CANADA MEDICAL SERVICE

Dr. Richardson, Chairman of the committee on economics, reported on the difficulty of getting prompt action from the various Plans which are to act together as a commission.

The importance of setting up common contracts was stressed.

INCOME TAX

In November last a sub-committee had an interview with the Hon. Minister of National Revenue to discuss several income tax matters of importance to our profession. The committee presented a brief and the various headings were discussed in detail.

(a) MEDICAL PARTNERSHIPS

Attention was drawn to inequality and uneven application of a ruling regarding payments in connection with medical partnerships retroactive to 1949. The Minister stated that his department was aware of the situation and was taking steps to clear up the matter satisfactorily.

Members by now will have been informed through the *Journal* (January 1952 issue) of the remedial action taken by the taxation division of the Department.

(b) EXPENSES OF ATTENDING MEDICAL MEETINGS

The sub-committee pointed out the desirability of attendance at medical meetings. The specific request was made that no limitation be placed on the number of official meetings of regularly constituted medical societies which Canadian doctors may claim as deductible for income tax purposes. It was further shown that participation in international congresses outside of America was highly desirable but that at present expenses at these meetings were not deductible.

The Minister replied that we might hope to continue to be allowed the present income tax abatements, but need look for no further extensions in this field, except perhaps the recognition of a fourth meeting further afield than the United States.

(c) POSTGRADUATE MEDICAL EDUCATION

In the view of the Minister, expenses incurred in postgraduate medical education are a capital expense, and we are unlikely to receive any income tax abatements in this field at present.

(d) AMENDMENTS TO INCOME TAX ACT

A certain number of clauses favourable to the salaried doctor are included in the amended Income Tax Act. These have been duly set forth in this issue.

(e) RETIREMENT FUNDS (PENSIONS)

The sub-committee put forward a request that some income tax relief be given for contributions to retirement funds. This gave rise to the question whether our Association wishes to enter the pension field for its members, and if so is it prepared to reopen its charter and seek the amendments necessary therefor.

In view of the difficulties and expense connected with such amendments, the Executive Committee decided by formal motion that our Association should not take any steps to enter the pension field at this time.

CONJOINT MEETING OF BRITISH MEDICAL ASSOCIATION AND CANADIAN MEDICAL ASSSOCIATION IN 1955

The General Secretary reported that the complete facilities of the Royal York Hotel, Toronto, had been booked for the week of June 20, 1955, and additional satisfactory accommodation will be secured in other hotels.

Discussions had already begun with the British Medical Association as it was not too soon for preliminary plans. The experience of the last B.M.-C.M.A. meeting in Winnipeg in 1930, provided valuable information. Two years before that meeting the local secretary from Winnipeg and the General Secretary spent two weeks in England discussing details with the B.M.A. It is recommended that this procedure be repeated in 1953.

A suitable memorial volume entitled, "The Book of Canada", was produced at the time of the Winnipeg conjoint meeting, the cost of which was met by a group of Canadian bankers and insurance companies.

COST OF MEDICAL CARE JOINT COMMITTEE WITH CANADIAN LIFE INSURANCE OFFICERS ASSOCIATION

It was reported that a third meeting had recently been held between representatives of the Canadian Life Insurance Officers Association and the Canadian Medical Association when the whole question of the cost of medical care was thoroughly explored and some very interesting figures presented.

It was found that the cost of medical care all the way from the near indigent to the higher income bracket was a constant figure of approximately 3.1% of income. The Canadian Life Insurance Officers Association are of the opinion that a scheme could be worked out by which people could insure for catastrophe at a very reasonable rate. In their language a catastrophe is anything which demands a larger payment from the insured than approximately 3.1% of their income. The Joint Committee is continuing its studies.

Canad. M. A. J.
Feb. 1952, vol. 66

IN THE DOCTORS' HANDS

Discussion among doctors across the country continues to put the spotlight on prepaid medical care plans—and the light is getting brighter all the time.

Doctors have such a stake in the plans, financially and politically, that the growing interest is natural. Discussion and interest inside and outside the profession has already contributed many helpful suggestions and improvements. Let's hope that continues.

The most important principle of all—and the one that has been such a potent stimulus in the formation of Trans-Canada Medical Services—is the principle of the professional freedom of the doctor-patient relationship.

It can be argued of course, that the voluntary prepaid plans constitute a wedge in the privacy of that relationship. To remain solvent, the plans must reserve the right to review the doctor's fee and analyze the service on which it is based. But this intrusion in the doctor-patient relationship can hardly be compared to a scheme under which doctors would either be on government payroll or would have fixed patient rolls, and receive payment from, and be responsible to, the national government.

Professional support of prepaid medical care plans—just as public participation—is growing steadily. As it does, doctors are naturally discussing among themselves and asking plan administrators about the long range financial stability of the plans. Perhaps the most frequently-discussed question is: "Should a prepaid plan cover home and office calls as well as in-hospital medical services?"

It is an understatement to observe that there is no pat answer or economic rule of thumb to decide how much coverage the plans should offer. But there are a few factors worth thinking about.

First, there is the question of what the people of Canada expect, and are going to expect in the future, in the way of medical services for their medical dollar. World-wide trends indicate that humanity expects more and more. But how much more? It is argued by many, and with considerable justification, that what the public needs is catastrophe insurance. Illness that results in large costs is associated with hospital care and medical services in hospital. Thus, if the prepaid plan covers care while in hospital it will probably prevent anyone from being bankrupted by medical bills.

But if the prepaid medical care plans are the doctors' alternative to government-controlled medicine and its defects, is in-hospital care insurance enough? The answer from many sides is "no!" Those who advocate national health insurance—be it voluntary or compulsory, prepaid or tax-paid, or a mixture of both—do so in the belief that it will raise the health standards of the country. Many hospital patients would not become hospital patients if they felt more economically free to consult a doctor during the early stages of an illness, before it reached catastrophe proportions. In addition, preventive medicine could hardly be expected to have its greatest possible effect under a program of insurance which covered only in-hospital care.

If the argument were reduced to its barest essentials, and perhaps over-simplified, it might be boiled down to this: it is not a matter of what the doctors feel the public needs; it is a matter of what the public wants and what the profession, government and public can provide. It involves compromise on the part of all three.

But, if insurance covering in-hospital care is not enough, can the prepaid plans cover home and office calls without going broke?

Those who say no believe so because of the number of trivialities that must be dealt with under such a plan running up administrative costs; because of abuse by the few. To be statistically sound a plan must charge its members what they run up in doctors' bills plus enough for administration. Financial soundness thus depends on the rate level. Of course to fill the social and economic need which prompts its formation, a plan cannot price itself out of the market. But it always has at its disposal the rate adjustment.

Concern is sometimes expressed over the financial reserves of the prepaid plan. But as one plan manager said recently "We have reserves which cover two or three months' expenses. But the most important reserves we have are the doctors who are our participating physicians. It is the doctors who stand behind this organization, and not money in reserves, that guarantee our future."

Prepaid medical care plans are so young, compared to other business enterprises, that any statement about what they can or cannot do is open to question. Yet even this limited experience would fill volumes. From it at least one axiom has emerged: the success of the plan lies in the hands of the doctor. "If the doctors discourage unnecessary treatment and are conscientious in rendering detailed accounts, they are doing their part," is the way one plan manager put it. "The rest is up to the administrators." He pointed out that abuse of the plan by doctors is so rare that only one in every 200 accounts goes beyond routine checking, usually because information is incomplete.

What the future holds for the prepaid plan and Trans-Canada Medical Services and its affiliates is by no means certain. But three things stand out:

1. The prepaid medical care plan is the doctors' alternative to government-run medicine; in the years ahead one of the two will survive.
2. The success of the plans lies in the hands of the doctors.
3. The broader a plan's coverage, the better its chances of filling the social and economic need which stimulates its formation.

A Doctor's Public Relations

Newspapers, by the way they treat medical news, greatly influence public attitudes towards doctors. Because of this, the thoughts of a newspaperman, who has an interest in medical affairs, are of interest. In conversation he said recently:

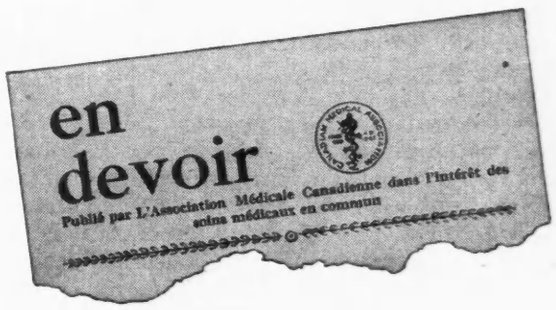
"Unless doctors are prepared to take patients more into their confidence, they must expect to continue to receive much unjust criticism. I can think of an example which is extreme, granted, and also involves the questions of treatment of chronic patients and how much a doctor should tell a dying patient. But the main point as far as I'm concerned is that doctors can do their profession a great service by giving their patients more information.

"Not long ago, a young couple came to our newspaper office to see me. They were not unintelligent people but they were almost hysterical. They had seen my byline over various medical stories and came to me as a last resort.

"The woman's mother had heart disease and was in serious condition. Recently she had shown some slight improvement. But the doctor had moved her from a large, modern hospital to an institution for chronic patients. Naturally she received somewhat less attention than she had been accustomed to. Soon her condition began to deteriorate. Her daughter, who had been worried, became frantic. In her mind, the move and the change in hospital care had been enough to hasten the end. She demanded that her mother be returned to the first hospital where she would be properly cared for. The doctor then informed her that nothing could be done to save her mother who was dying. The daughter replied that this was an excuse and took the matter to the superintendents of both hospitals. They checked the facts and repeated the doctor's diagnosis. But nothing would comfort the young couple. They had a good many things to say about the hard-heartedness of the doctor and both institutions.

"I checked the facts and this is what I found. The patient's death had been foreseen by the doctor for some months. He had not told either the patient or her daughter. In fact the daughter had no conception of the seriousness of her mother's condition. Then when the time came that the doctor was forced to tell her, the woman's thinking had become so emotional that to her it was 'an excuse' for inadequate care. As a matter of fact, I found out later that for some months the patient had been actually living on borrowed time and it was medically difficult to understand how she went on living.

"However, in their ignorance, you can imagine what that young couple are saying about doctors. The tragedy is that the unpleasantness could have been avoided. I know the job that doctors individually and collectively are doing and I hate to see them get a black mark in a case like this as a result, not of medical incompetence, but lack of public relations thinking. Patients have a right to be taken into the doctor's confidence."



ENTRE LES MAINS DES MEDECINS

Au cours des discussions parmi les médecins d'un littoral à l'autre du pays, la question du projet concernant le service médical payé d'avance continue d'être le sujet principal—et la perspective devient de plus en plus brillante.

Les médecins ont un tel intérêt en jeu dans le projet en question, tant au point de vue financier que celui de la politique, que l'intérêt croissant est très naturel. Les discussions et l'intérêt, en dedans comme en dehors de la profession, ont déjà contribué beaucoup de suggestions utiles, en vue d'amener une amélioration dans l'état des choses. Il faut espérer que cela continue.

Le principe le plus important—et celui qui a exercé une influence si décisive dans la formation des Services Médicaux Trans-Canada—est le principe de la liberté professionnelle du docteur et de l'intimité de la relation entre le docteur et le patient.

L'on peut remarquer, naturellement, que ces mesures prises volontairement au sujet du service médical payé d'avance constituent une brèche dans l'intimité de cette relation. Afin de demeurer solvable, ce programme doit réserver le droit de faire l'examen critique des honoraires du médecin et d'analyser le service sur lequel ils sont basés. Mais cette intrusion dans la relation intime entre le docteur et le patient peut être à peine comparée au plan, en vertu duquel les médecins seraient, soit payés par le gouvernement ou possèderaient des listes de clients, dressées d'avance, d'après lesquelles ils seraient rémunérés ou se

Canad. M. A. J.
Feb. 1952, vol. 66

tiendraient responsables au gouvernement national.

L'appui professionnel apporté au projet du service médical payé d'avance—de même que la participation publique—croît avec persistence. En constatant le fait, les médecins naturellement discutent de la chose entre eux et s'informent auprès des administrateurs du plan de la stabilité financière à longue portée du programme. Peut-être la question qui se pose le plus fréquemment est celle-ci: "Est-ce qu'un tel projet est censé couvrir les visites à domicile et au bureau, aussi bien que les services médicaux dans les hôpitaux?"

A ce sujet, l'observation qu'il n'y a pas de réponse toute prête ou de méthode économique empirique pour déterminer l'étendue du service que le projet doit couvrir, est même audessous de la vérité. Cependant, il y a quelques facteurs qui méritent la peine d'être considérés.

D'abord, il y a la considération de ce que le peuple canadien espère recevoir, ou s'attend à recevoir, en ce qui concerne les services médicaux, en échange de leur argent. Le cours de l'opinion publique, observé dans le monde entier, révèle que l'humanité s'attend a recevoir davantage. Mais combien plus? D'aucuns remarquent avec beaucoup de justesse d'ailleurs que ce dont le public a besoin est l'assurance contre la catastrophe. La maladie que occasionne de grosses dépenses est généralement associée aux soins des hôpitaux et du service médical dans les hôpitaux. C'est pourquoi, si le plan du service médical payé d'avance comprend les soins pendant le séjour à l'hôpital, il empêchera probablement la banqueroute dans le cas d'une personne submergée par des factures médicales.

La question se pose encore: si le projet du service médical paye d'avance constitue le plan alternatif à celui de la médecine controllée par le gouvernement avec ses désavantages, est-ce que l'assurance des soins données dans l'hôpital est suffisante? La réponse d'un grand nombre de gens est 'non!' Ceux qui sont en faveur de l'assurance pour la santé nationale—qu'elle soit volontaire ou obligatoire, payé d'avance ou payée par la taxe, ou une combinaison des deux procédés – croient fermement que cette mesure élevera le niveau de la santé dans le pays. Beaucoup de patients éviteraient un séjour à l'hôpital, s'ils pouvaient se sentir plus à l'aise, économiquement parlant, pour consulter un médecin pendant les premiers stages d'une maladie, surtout avant qu'elle n'atteigne des proportions alarmantes. De plus, l'on ne peut s'attendre à ce que la médecine préventive ait son plus grand résultat possible sous un programme d'assurance couvrant seulement les soins dans l'hôpital.

Si la thèse se trouvait réduite à ses caractéristiques les plus simples, et peut-être même simplifiée outre mesure, elle pourrait se résumer comme ceci: ce n'est pas tant une question de ce que les médecins décident au sujet des besoins du public, mais de ce que le public lui-même désire, et aussi de ce que la profession elle-même, le gouvernement et le public peuvent fournir respectivement. Cela comporte un compromis de la part de toutes trois parties en cause.

Une autre question se pose: mais si l'assurance couvrant les soins dans l'hôpital ne suffit pas, le plan du service médical payé d'avance peut-il comprendre aussi des visites à domicile et au bureau, sans faire banqueroute?

Ceux dont la réponse est négative offrent comme raison le nombre des trivialités qu'entraîne le projet, et qui augmentent les dépenses administratives. Ils signalent aussi les abus de la part de quelques-uns. Du point de vue de la statistique, un plan, pour être solvable, doit exiger à ses membres de payer la somme de leurs factures médicales et aussi de quoi suffire aux besoins de l'administration. Le bon état des finances dépend aussi du niveau du tarif. Naturellement, pour faire face au besoin social et économique qui a suscité sa formation, un plan ne peut fixer un prix en dehors du cours du marché. Mais il a toujours à sa disposition l'adjustement du tarif.

L'on manifeste quelquefois de l'inquiétude au sujet des réserves financières du plan du service médical payé d'avance. Mais comme l'a fait remarquer notre directeur récemment: "Nous avons des réserves qui couvrent deux ou trois mois de dépenses. Cependant, la réserve la plus importante que nous possédons est constituée par les docteurs qui sont nos médecins participants. Ce n'est pas tant de l'argent en réserve, mais les médecins supportant notre organisation qui garantissent de notre avenir."

Le plan du service médical payé d'avance est à un stage si peu avancé, comparé à d'autres entreprises dans le monde des affaires, qu'aucuns déclaration à cette heure des résultats de son œuvre ne peut être considérée comme finale. Cependant, même les faits observés au cours de ces premiers efforts rempliraient des volumes, et ont fait ressortir cette vérité: le succès du plan est entre les mains du médecin. "Si les médecins découragent tout traitement superflu, et se montrent consciencieux en faisant des comptes détaillés, ils s'acquittent de leur tâche," déclare un des directeurs du plan. "Le reste est l'affaire des administrateurs." Il signala aussi que l'abus du plan par les médecins est si rare que seulement un sur 200 comptes exige plus que la routine coutumière pour être vérifié, d'ordinaire à cause des renseignements incomplets."

Ce que l'avenir réserve à l'égard du plan du service médical payé d'avance, des Services Médicaux Trans-Canada et leurs affiliés, n'est pas tout-à-fait certain. Mais ces trois considérations en ressortent:

1. Le plan médical payé d'avance est la proposition que les médecins offrent contre la médecine controllée par le gouvernement: d'ici un an l'un des deux plans subsistera.

2. Le succès du plan réside entre les mains des médecins.

3. Plus grande est l'étendue d'un plan, plus favourable est sa chance de satisfaire le besoin social et économique qui suscite sa formation.

LES RELATIONS PUBLIQUES D'UN MÉDECIN

Les journaux, par la façon dont ils traitent les nouvelles médicales, influencent beaucoup les sentiments du public envers les médecins. C'est pourquoi les réflections d'un journaliste qui s'intéresse aux affaires médicales, sont dignes d'attention. Au cours d'une conversation, il déclara récemment:

"A moins que les médecins soient prêts à mettre leurs patients plus qu'auparavant dans le secret, ils doivent s'attendre à recevoir des critiques très injustes. Il me vient à la mémoire un exemple, qui est extrême peut-être, mais qui comporte la question du traitement des patients chroniques et aussi combien un médecin doit révéler à un mourant. Le point essentiel, selon moi, est que les médecins peuvent rendre un grand service à leur profession en donnant à leurs patients plus de renseignements sur leur état.

"Il n'y a pas longtemps de cela, un jeune couple vint me voir au bureau. Ils n'étaient pas des gens peu avisés, mais ils étaient en proie à une attaques de nerfs. Ils avaient lu mon article concernant plusieurs histoires médicales, et vinrent à moi comme dernière ressource.

"La mère de la femme était affligée de la maladie de cœur et se trouvait dans un état sérieux. Récemment elle avait montré une légère amélioration. Cependant, le docteur l'avait fait transférer de sa chambre dans un grand hôpital moderne à une institution pour les patients chroniques. Naturellement, elle reçut un peu moins de l'attention coutumière. Bientôt son état commença à se détériorer. Sa fille, déjà soucieuse, devint folle d'anxiété. Selon elle, le transfert et le changement de soin médical avaient été la cause de la détérioration dans l'état de sa mère. Elle demanda que celle-ci soit ramenée à son ancien hôpital, où elle recevrait les soins nécessaires. Ce fut alors que le médecin lui déclara que rien ne pouvait être tenté pour sauver sa mère qui se mourrait. La fille répondit que cela n'était qu'une excuse et alla consulter les surintendants des deux hôpitaux. Ils vérifièrent les faits et répétèrent le diagnostic du médecin. Mais rien ne put réconforter le jeune couple. Par la suite ils eurent beaucoup à dire au sujet de l'indifférence du médecin et des deux institutions respectives.

"Je fis une enquête personnelle, et voilà ce que je constatai: la mort du patient avait été prévue par le médecin quelques mois auparavant, mais il n'avait rien dit soit au patient ou à sa fille. A vrai dire, la fille n'avait aucune conception de l'état très grave de sa mère. Alors quand vint le moment ou le médecin se vit forcé de la mettre au courant de la situation, la pensée de la femme, obscurcie par l'émotion, considéra la confidence du médecin comme 'une excuse' pour cacher des soins insuffisants. Je découvris plus tard que pendant quelques mois déjà le patient avait vécu 'en retard de sa dernière heure', et il était difficile, au point de vue médical, d'expliquer comment elle tenait encore à la vie.

"Vous pouvez vous imaginer, naturellement, les réflections du jeune couple à l'égard des médecins. Ce qui est tragique dans cette affaire, c'est que toute cette amortume aurait pu être évitée. Je suis au courant du travail accompli par les médecins, individuellement et collectivement, et je déteste l'idée de les voir devenir la cible de ressentiment dans un cas pareil, pour cause non pas de l'incompétence médicale, mais du manque de la considération du facteur relations publiques. Les patients ont le droit d'être dans la confidence du médecin."

CORRESPONDENCE

RE- VALUE OF PNEUMOTHORAX

To the Editor:

In a recent number of this journal, Dr. W. B. Phair presents a study of results of pneumothorax. I think it important to point out that by a species of statistical wizardry pneumothorax results are, in this article, made to appear at a disadvantage which is greater than a rearrangement of his own figures would demonstrate. He has classed as "poor results" cases in which pneumothorax was discontinued because it was found to be ineffective. Since he has not shown that the trial of pneumothorax was harmful, these cases should surely have been classed only as "not continued" and might be considered in the same category as not having been tried. If all these results are removed from this "poor" classification, this would automatically raise the percentage in the "good" and "fair" categories.

He has classed a result as "fair" when the object of pneumothorax was achieved even at an "excessive price". Who is to say what is an excessive price for survival? He has not shown that any other single method could have done better.

He has classed as a "poor" result those cases in which relapse occurred at some time after re-expansion of pneumothorax in spite of the fact that a temporary arrest was achieved. Objection may be taken to this statistical treatment on the same grounds that he has not shown that any other method of collapse could do better. It may be pointed out that extensions of disease occur under thoracoplasty and are less easily detectable and lead to that process which the late Dr. Parfitt has referred to as "weaving ropes of sand to contain progressive tuberculosis" and in particular revisions, saucerizations and lobectomies that may be necessary after thoracoplasty. Each stage of this process has its separate mortality and the sum is considerable. Furthermore it should be noted that at least half of the relapses after pneumothorax occur on the contralateral side.

Dr. Phair has not applied the same exacting standards to any other single method for a comparable group of cases and yet in his closing paragraph he restricts the use of pneumothorax to what appears to be a ridiculously limited field, showing that his unfair statistical treatment is at least influencing his own judgment in the application of pneumothorax.

The danger of such an article is that it may to a greater degree influence the judgment of others.

T. G. HEATON, M. B., F.C.C.P.,
Toronto, Ont. Chest Consultant.

Canad. M. A. J.
Feb. 1952, vol. 66

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

COLLEGE OF GENERAL PRACTITIONERS

Much interest has been evinced in a suggestion, originally mooted some months ago by two general practitioners in the weekly medical press, that a College of General Practitioners should be established to help to safeguard the standards of general practice. The suggestion has been enthusiastically supported by general practitioners and has received the blessing of many consultants. That some such organization is required to allow general practitioners to protect themselves from gradual degradation to the level of "clearing agents" for the hospitals and consultants of the country is abundantly clear.

The problems involved in organizing such a College (or Academy, as many would prefer to call it) are by no means negligible, but the originators of the suggestion have just announced the setting up of a "general practice steering committee" to guide the project through its next stage. This committee consists of five general practitioners and five consultants representative of the three Royal Colleges, the Society of Apothecaries and the Postgraduate Federation. The committee has been fortunate in its chairman: the Rt. Hon. Henry Willink, K.C., Master of Magdalene College, Cambridge, a former Minister of Health and a brilliant lawyer. It has a difficult task, but all interested in the future of medicine in this country will wish it well in its efforts to find the answer as to how the status of the general practitioner can be maintained in a national health service.

THE ATTACK ON INFLUENZA

The Government's plans for dealing with an influenza epidemic, should such develop this winter, have now been announced. Medical officers of health have been requested to obtain information from general practitioners in their areas, especially when there is a sudden increase in attendances at surgeries or requests for visits. An intensive effort is also to be made to obtain samples of the virus from patients when influenza first appears. Medical officers of health are also to be responsible for collecting data from doctors in charge of industrial and residential communities, units of the armed forces and hospitals. Medical officers at ports and airports are to be on the lookout for the occurrence of influenzal infections among incoming passengers and crews. The Ministry of National Insurance is to supply details of sickness claims should there be a sudden increase in these. In the event of an epidemic developing, registrars are to provide daily reports of total deaths and deaths from pneumonia, bronchitis and influenza, whilst arrangements are to be made with hospitals to keep beds reserved for selected patients with severe respiratory infection so that they can be given early treatment with new drugs. Laboratory testing is to be developed in an attempt to distinguish between the various types of respiratory infection during the coming months. Finally, the Ministry of Health has decided to support the production of virus vaccine on a much larger scale than ever before, and the Medical Research Council is to arrange extensive clinical trials of this.

ST. THOMAS'S HOSPITAL

By virtue of its commanding site on the south bank of the Thames, extending from Westminster Bridge to Lambeth Palace, and facing the Houses of Parliament and Big Ben, St. Thomas's Hospital is one of the best known hospitals to the visitor to London. It is also one of the most ancient hospitals in the Capital, and on St. Thomas's Day (December 21) the second founding of the Hospital under Letters Patent granted by King Edward VI in 1551, was commemorated at a service in Southwark Cathedral. The vast congregation which filled the Cathedral, and which included Her Majesty the Queen, participated in a service rich with the traditional pomp and ceremony of the Church. The service was conducted by the Archbishop of Canterbury who was accompanied by three Bishops and the Provost and Chapter of the Cathedral, all in their colourful ceremonial robes. It was an impressive tribute from the Church and the Royal Family to a hospital which for more than eight hundred years has unremittingly served the sick and suffering of London. Its vicissitudes have been many—destroyed by fire in the 13th century, dissolved by Henry VIII in the 16th century, and brutally damaged by aerial bombardment during the 1939-45 war. Indeed it has the proud, if unenviable, record of being the most bombed hospital in London. Throughout it all, it has maintained its tradition of service, and today, with one of the leading medical schools of the country, a nursing school which bears the honoured name of Florence Nightingale, and an outstanding school of physiotherapy, it faces the future with confidence.

ROYAL HONOURS

It was a characteristically thoughtful action on the part of the King that he should have chosen his birthday, December 14, as the occasion for conferring knighthoods upon Mr. Price Thomas, the surgeon who performed the lung resection upon His Majesty, and Dr. Geoffrey Marshall, one of the four physicians in attendance upon him during his illness and operation. This is a fitting tribute to the two members of the medical team in attendance upon the King during his illness, who have borne the brunt of the heavy responsibility involved.

London, January, 1952. WILLIAM A. R. THOMSON

OBITUARIES

DR. HAROLD G. ARMSTRONG, aged 56, died on December 7 at St. Michael's Hospital. He had been in ill health for some months.

Dr. Armstrong was on the staff of St. Michael's Hospital and specialized in thyroid surgery. He was born at Brussels and graduated in medicine from the University of Toronto in 1920, when he established a practice here. Completing a period of postgraduate study overseas, Dr. Armstrong returned to Toronto in 1927 to engage in surgery. He was a member of the Academy of Medicine and the Canadian and Ontario Medical Association. Surviving are his widow, one son, and a daughter.

DR. WILLIAM KIRK COLBECK, aged 73, founder of the Colbeck clinic, Welland, Ont., died on November 20, 1951. Dr. Colbeck, who was born in Welland, pioneered in radiology. He founded his clinic in 1921, and in 1936 was president of the Ontario Medical Association. He is survived by his widow and a daughter.

DR. ROBERT GEORGE EDWARDS, aged 77, physician in Brampton, Ont., for 43 years, died on December 8. He had practised little since 1940. Born at Hornby, Ont., Dr. Edwards taught school for several years before studying medicine. He is survived by his widow, and one daughter.

DR. KEITH C. FALKNER, chief radiologist at St. Joseph's Hospital, died suddenly on December 4, 1951, in Chicago. He was 39. He had been attending a convention of the American College of Radiology.

Born in Vancouver, 1912, Dr. Falkner graduated from Queen's University School of Medicine in 1936, He practised for two years at Gore Bay, Manitoulin Island, before joining the R.C.A.M.C. in 1939, with which he

reached the rank of major and saw service in Italy and France. Toward the end of the war Dr. Falkner did postgraduate work in radiology at the Royal Cancer Hospital and Middlesex Hospital, London, England. He received certification by the Royal College of London, England, and the Royal College of Canada. He became a member of the American College of Radiology and of the Canadian Association of Radiologists, and other Canadian radiological societies. Surviving are his widow, and one son.

DR. R. H. FRECHETTE, aged 39, died suddenly in Willow Bunch, Saskatchewan, on November 4. Born at Ottawa, Dr. Frechette attended primary and high school in his native city and studied medicine at Laval University where he graduated in 1939. After a few months' practice at Blind River, Quebec, he moved to Willow Bunch and became municipal doctor in that area. He was active in the organization of the community hospital in 1942 and in the formation of the union hospital which was built in 1945. He is survived by his widow and three daughters.

DR ANDRE GELINAS, médecin attaché à l'hôpital des Anciens combattants, à Saint-Hyacinthe, Québec, est décédé à Saint-Boniface de Shawinigan, à l'âge de 78 ans et 5 mois. Il exerçait la médecine aux Trois-Rivières, depuis 1918, et il avait été conseiller municipal de la ville. Outre son épouse, le défunt laisse huit enfants.

DR. ALBERT MOORE GLOVER died in New York City on November 17 in his 45th year. Dr. Glover graduated in medicine from Queen's University in 1934. In 1942 he went overseas with the 14th Canadian General Hospital. He was not in good health since he came back to Canada in 1945 and was attached to the D.V.A. at Camphill Hospital in Halifax where he was chief anæsthetist. After serving at a hospital in Chicago and one in Troy, N.Y., Dr. Glover returned to Kingston in 1949 and then moved to New York.

DR. ARCHIBALD AARON GRAY, aged 82, of Vancouver, B.C., former medical missionary and sponsor of free clinics at First United Church for many years, died on November 4, 1951. A medical missionary in Formosa for 18 years, Dr. Gray had practised in Vancouver since 1922. On his return from the Far East because of ill health, he took a postgraduate course in Chicago as an eye specialist and opened his free clinic. Born in Eagle, Ontario, he graduated in medicine from Queen's University. He is survived by a daughter.

DR. FRED HILTS, aged 76, of Kennedy, Sask., who practised medicine in this district for 45 years, died on December 8, 1951. Dr. Hilts was honoured in 1946 when 1,000 people of Kennedy and the surrounding district gathered to show their appreciation. The gathering included 500 people whose birth he had attended. Born in Creemore, Ont., Dr. Hilts moved west in 1891.

DR. ROBERT DUNCAN KIPPEN, aged 76, died suddenly on December 24. He graduated from Manitoba Medical College in 1905 and practised continuously at Newdale, Man. In addition to giving devoted professional service to the community he served on the school board and the United Church board. Three of his sons graduated in medicine from Manitoba University. Of these James Wendell Kippen was lost at sea by enemy action in 1941, Neil and Duncan practice in Winnipeg. In addition to the two latter he is survived by his wife, a son Bruce, a daughter Margaret Millar and nine grandchildren.

DR. DONALD D. McLAREN, of Calgary, Alta., died on November 25, 1951. He had been in practice in Calgary since 1903. Dr. McLaren was born in Russell, Ont., and in 1903 graduated in medicine from McGill University. He is survived by his widow and two daughters.

DR. HECTOR MORTIMER, F.R.C.S., consulting otologist of the Montreal General Hospital since 1938 died at his home at Ste. Agathe after a brief illness on December 25. Dr. Mortimer graduated from the University of Aberdeen in 1914 and was elected Fellow of the Royal College of Surgeons, Edin., in 1924. He practised on Harley Street, London for some years, specializing in gynæcology, and came to Canada in 1934. He was interested in the relation of endocrines to the diseases of the ear and much of his research in this field had been carried out in the department of otolaryngology in the Montreal General Hospital. As a research Fellow in the Department of Medicine of McGill University Dr. Mortimer conducted a number of research projects for the department of medicine. He is survived by his widow.

DR. ARTHUR CHARLES ODELL of Ottawa, Ont., died suddenly in hospital on November 8. He was 36. A graduate of Queen's University medical school in 1942 he shortly afterwards joined the R.C.A.F. and served as a medical officer for four years. Surviving are his widow and one son.

DR. G. OLIN, of Winnipeg, died in the Winnipeg General Hospital after being injured in a truck-car collision north of Morris, Man., on December 3. He was 30 years of age. At the time of the accident Dr. Olin was driving his car to Prescott, Ont., where he had planned to start a new practice.

DR. CHARLES D. PARFITT, aged 79, former medical director of Calydor Sanatorium, Gravenhurst, Ont., died on November 21, 1951 in hospital at Boston, Mass., from a coronary thrombosis. A native of Delaware, Ont., Dr. Parfitt attended Trinity College School. In 1894 he graduated in medicine from Trinity College. Following graduation he did postgraduate work at St. Bartholomew's Hospital, London, England, at Cambridge, in Vienna and at Johns Hopkins Hospital, where he was a contemporary of Sir William Osler.

While studying at Johns Hopkins, Dr. Parfitt contracted tuberculosis and was sent to Gravenhurst Sanatorium for treatment. He received his M.R.S.C. in England and was made a Fellow of the Royal College of Physicians and Surgeons (Canada) in 1929. He joined the staff of the Loomis Sanatorium, New York State, in 1937, where he remained for a year. In 1942 he was chosen to deliver the Osler oration at the Canadian Medical Association annual meeting. His widow and two daughters survive.

DR. JAMES PRATT, 84, died on December 7, 1951. Rural folk remembered him for the way he carried on the high tradition of the friendly country doctor. Once, with a lamp as his only light, he amputated a farmer's arm.

Dr. Pratt received his medical degree from Dalhousie University in 1900. After two years of practise he developed tuberculosis. But, under his own care, he became cured within two years. After practising for a short while in the United States, he returned to the nearby village of Alton, N.S., where he remained for 40 years.

DR. RUBY RAIKOV, aged 26, formerly of Windsor, Ont., died in Albany, N.Y. on November 30, 1951. Born at Regina, she graduated from the University of Western Ontario in medicine in 1950, and was doing postgraduate work at the Albany General Hospital. Dr. Raikov attended Kennedy Collegiate. She is survived by her parents.

DR. J. SPENCE REID, aged 57, died on November 29, 1951, at Toronto Western Hospital. Dr. Reid was born at Tillsonburg, where he received his early education. He interrupted his course at the University of Toronto to enlist in the First World War and went overseas with a medical unit.

After graduating in medicine from the University of Toronto, Dr. Reid spent 4½ years with the Mayo Clinic, Rochester, Minn. He returned to Toronto and established a practice. He leaves his widow and two sons.

Canad. M. A. J.
Feb. 1952, vol. 66

DR. WILLIAM H. ROSE died on November 11, 1951, in Cornwall, Ont. He had not been well for some time. He was a veteran of both world wars. Born at Dunbar, Dundas County, 56 years ago, he was educated at Chesterville, Morrisburg high schools and McGill University. He was overseas on active service five and a half years. He is survived by his widow and one son.

DR. EDWARD HERBERT SAUNDERS, aged 81, of Vancouver, B.C., died on November 26, 1951. He had been in practice in Vancouver for 42 years as an eye, ear, nose and throat specialist. Dr. Saunders, born in Woodstock, N.B., attended Acadia University and graduated from McGill Medical School in 1895. During the First World War he was with the 18th Field Ambulance, R.C.A.M.C. He was senior consultant at Vancouver General and Grace Hospitals. He leaves his widow, a daughter, and a son.

DR. EDWIN SEABORN, a prominent physician, historian, author, and soldier died in St. Joseph's Hospital, London, Ont., on November 27, 1951. Dr. Seaborn added greatly to the history of medicine in the district with his book, "The March of Medicine in Western Ontario". Dr. Seaborn was born in Rawdon, in the Quebec Laurentians. He came to London in 1879 and entered the University of Western Ontario Medical School in 1891. After his graduation in 1895 he taught anatomy. He rose to the post of professor in surgery. In 1916 he organized No. 10 Stationary Hospital of U.W.O., which was sent overseas, and took over hospitals at Seaford, Eastbourne, and later in Calais. In 1938 Western conferred on him the honorary degree of Doctor of Laws. As a contribution to the public and university libraries Dr. Seaborn indexed a file of a collection of old Ontario papers dated as far back as 1815. It was a hobby with him. Surviving are his widow and a daughter.

DR. KOZO SHIMO-TAKAHARA, of Kaslo, B.C., died following a heart attack on November 30, 1951. "Dr. Shimo" as he was known to his friends, had endeared himself to hundreds in this community, by his unselfish devotion to his profession. He was born in Kagashima, Japan, in 1885, and came to Canada as a boy, attending school in Vancouver, and later graduating from Chicago Medical School. He came back at once to Vancouver, where he practised successfully for thirty years before moving to Kaslo. Dr. Shimo was a devout Christian, and has served many years on The Session of St. Andrew's United Church in Kaslo. He was also an active member of Kaslo Board of Trade. He leaves to mourn him his widow, one daughter and two sons.

DR. CHARLES BUCKINGHAM SHUTTLEWORTH died in Toronto on September 5, 1951. He was erroneously shown in our December issue as "Dr. Charles Buckingham" only. He was born in Toronto in 1870, and graduated, gold medallist, from Trinity University in 1894. He served in World War No. 1. An enthusiastic teacher, he taught both anatomy and surgery. His widow and two sisters survive.

ABSTRACTS *from current literature*

MEDICINE

The Rôle of Para-Aminosalicylic Acid in the Emergence of Streptomycin-Resistant Tubercle Bacilli.

LEWIS, W. G., ARANY, L. S. AND JOHNSON, B. H.: DIS. OF CHEST, 19: 566, 1951.

Studies have shown that prolonged therapy with streptomycin causes the tubercle bacilli to become resistant to streptomycin. The authors studied 162 patients with acid-fast infections, receiving 42 to 120 grams of streptomycin in doses of one gm. per day and para-aminosalicylic acid, 8 to 15 gm. per day for the same length of time. Streptomycin sensitivity tests were made at 60, 90, and 120 days. One group (43) received streptomycin, 1 gm. per day for 42 days and no para-aminosalicylic acid (P.A.S.)—54% had streptomycin-resistant bacilli at 120 days. The most satisfactory group (38) were those who received streptomycin, 1 gm. per day for 120 days and P.A.S. 12 gm. per day for the same time interval—0.04% were streptomycin-resistant at the 120 day test. Hence the concomitant use of P.A.S. and streptomycin causes a delaying effect of the emergence of bacilli resistant to streptomycin, whereas there is no delaying effect on the resistance of tubercle bacilli to P.A.S.

J. A. STEWART DORRANCE

Plasma Protein in Toxæmia of Pregnancy.

MACK, H. C. *et al.*: J. CLIN. INVEST., 30: 609, 1951.

The authors review the literature and note that a definite hypoproteinæmia, greater than that observed in normal pregnancy, is found in the toxæmias. The presence of a toxic protein (an atypical euglobulin) during menstruation, labour, and toxæmia of pregnancy was also recorded. It is present in primigravida more frequently than in multipara. A grave prognosis in eclampsia is indicated by a falling fibrin level and two cases of fatal fibrinoginæmia in eclampsia are recorded. Using the electrophoretic technique of analysis the authors examined the blood of 29 women in the last trimester of pregnancy, after a diagnosis of toxæmia had been made. They found that the alpha$_2$ globulins and fibrinogen are increased and gamma globulins and albumin decreased in the protein content of the blood. As these eclamptogenic effects occurred on the basis of percentages of total protein as well as in terms of plasma, the alterations are not due to changes in blood volume.

J. A. STEWART DORRANCE

Incompatible Blood Transfusions with Emphasis on Acute Renal Failure.

MUIRHEAD, E. E.: SURG., GYNEC. AND OBST., 92: 734, 1951.

Rare isoimmunizations and human errors cause incompatible blood transfusions. Antibodies from the recipient's plasma destroy the infused red cells and cause intravascular hæmolysis. Two types of reaction may occur: minor incompatible reaction, with chill, followed by fever for 4 to 8 hours, generalized complaints, and no evident hæmoglobinuria or lasting sequelæ; and major incompatible reaction of chill, fever of 2 to 6 degrees, generalized complaints, hæmoglobinæmia, hæmoglobinuria and renal failure.

Of 37 patients who had been given incompatible blood transfusions of 100 to 1,000 ml., 28 (75%) had major incompatibilities, and renal failure developed in 24 (65%). The cause of renal failure is not fully understood. The clinical course of acute renal failure may be divided into three phases. Phase I—shock—lasting a few hours, is manifested by hypotension and a tendency toward a hæmorrhagic state. The larger the transfusion of incompatible blood the greater the tendency to hæmorrhagic diathesis. Phase II—renal insufficiency—developing within 24 hours, with azotæmia and oliguria. Blood urea is elevated and rises to a peak of 500 mgm. % in 5 to 9 days, it remains level until death or recovery. Anuria may occur for 1 to 3 days, usually, however, oliguria is present for 5 to 10 days. When recovery occurs a diuresis of 3 to 12 litres per day occurs to remove the accumulated waste products of metabolism. Acidosis, due to the accumulation of organic acids, sulphates and phosphates, associated with a carbon dioxide combining power of 35 vol. % (16 mEq/L) and hypo-

chloræmia frequently occurs in this phase. Phase III—recovery—occurring between the fifth and twelfth days and marked by diuresis with a high content of sodium chloride and potassium, followed by a period of convalescence of 1 to 6 months, when normal renal function is restored and maintained.

In the conservative management of renal failure during phase I, treat the shock by transfusions of compatible whole blood. The hæmorrhagic condition may be corrected with ACTH or toluidine blue. During phase II, for the oliguria give 1,000 ml. water per 24 hours to cover insensible loss as well as a volume equal to the urinary output of the previous 24 hour period. When the carbon dioxide combining power has fallen below 35 vol. % (16 mEq/L.) give 4 to 6 gm. sodium bicarbonate in divided doses of 1.0 gm. per hour to a total of 10 to 30 gm. over 4 to 8 days. When the plasma chloride concentration falls below 80 mEq/L. give 100 ml. of 3.0% NaCl solution or 350 ml. physiological saline, one or two times per day. A diet low in protein maintains caloric intake and reduces blood urea and N.P.N. Anæmia of renal failure may be corrected by transfusions of compatible whole blood, when the hæmoglobin is less than 10 gm. %. If infection occurs, penicillin may be given in ¼ to ½ of the normal doses. In phase III the diuresis should be maintained for 3 to 5 days and the excessive loss of water, sodium chloride, potassium, should be replaced. The conservative treatment of acute renal failure leads to recovery in 80% of cases when initiated at the onset.

J. A. STEWART DORRANCE

Bacitracin in Dermatology: Its Effectiveness in Topical Therapy.

FINNERTY, E. F.: NEW ENGLAND J. MED., 245: 14, 1951.

A study of the value of bacitracin in the topical therapy of 83 cases leads the author to the conclusion that it is the most effective agent at present available for the treatment of infected skin lesions. Not only is bacitracin one of the most efficient bactericides that has been introduced into dermatological practice but it has the added advantage of having a low sensitization index and allergic reactions are very unusual.

NORMAN S. SKINNER

The Relation of Sex, Pregnancy and Menstruation to Susceptibility in Poliomyelitis.

WEINSTEIN, L., AYCOCK, W. L. AND FEEMSTER, R. F.: NEW ENGLAND J. MED., 245: 54, 1951.

Study of statistics concerning the incidence of poliomyelitis in Massachusetts, and of cases admitted to the Haynes Memorial Hospital, Boston, confirms the previously accepted fact that pregnancy increases susceptibility to the disease and that delivery during the acute stage of infection increases the risk of extension of paralysis. Poliomyelitis is more common among adult females than among adult males. About three-fourths of women patients developing poliomyelitis have a menstrual period from five days before to four days after the clinical onset.

The fact that sex, pregnancy and menstruation influence susceptibility to poliomyelitis suggests an important influence of endocrine factors on the pathogenesis of the disease.

NORMAN S. SKINNER

Diabetic Acidosis.

HARWOOD, R.: NEW ENGLAND J. MED., 245: 1, 1951.

In a series of 67 consecutive cases of diabetic acidosis treated on the wards of the Massachusetts General Hospital between November 1, 1944 and June 1, 1950 there was only one fatality, which occurred in a 75-year-old female early in the series. Mild cases of diabetic acidosis were not included in the study. The excellent results obtained were considered to be due to several factors, continuously available laboratory service allowing for frequent blood sugar estimations day and night; constant attendance of each case by a house officer during the first twenty-four hours of treatment or until the patient's condition warranted routine ward care; a carefully followed routine of treatment recorded on a special record form, or "coma sheet"; massive doses of insulin averaging 1,280 units per case for the first 24 hours of treatment; and parenteral fluid therapy consisting of the initial use of an isotonic saline-lactate mixture followed by a solution containing potassium and phosphate ions.

NORMAN S. SKINNER

Difficulties in The Management of Congestive Heart Failure.

KOSSMAN, C. E.: POSTGRAD. MED., 10: 433, 1951.

The management of the syndrome of congestive heart failure is a highly individualized matter which depends upon the patient, the particular heart disease, and the special and variable circumstances which precipitate the failure. The methods of therapy are standard—rest, digitalis, diuretics, and restriction of sodium in the diet. Patients with severe congestive heart failure are put to bed to achieve a reduction of the metabolic needs of the body and to increase renal blood flow to a maximum. Extracellular fluid may be mobilized during the first 24 hours the patient is in bed. The bed should be tilted to keep this fluid away from the heart. Patients with far advanced chronic heart failure may need "chair treatment" and little more can be done for them. Thromboembolism, negative calcium and nitrogen balance, massive pulmonary collapse, constipation, and urinary retention are the hazards of strict bed rest. Morphine is seldom needed for more than 48 hours, after this initial period, chloral hydrate or one of the barbiturates may be used at night. There is some confusion arising from the large number of preparations of digitalis and claims for all round use. However, oral whole digitalis leaf still has no peers. Rapid digitalization is unnecessary in progressive heart disease and may be done by the oral method in divided doses, particularly in patients over 60 years of age. If the heart failure increases despite an increasing dose of digitalis, discontinue it for 48 to 72 hours and if it worsens, then re-institute digitalis in larger doses. The mercurial diuretics are by far the best for decreasing hypervolæmia and œdema in heart failure. It is an unfavourable trend to give intramuscular or intravenous mercurial diuretics daily, and to continue these long after the drug has become ineffective—leading to mercurialism, or the low salt syndrome. Potentiation of action is caused by aminophylline, 0.48 gm. intravenously or ammonium chloride, 1 to 2 gm., t.i.d., for 2 to 3 days. Ammonium chloride should not be given continuously because the kidney forms ammonium and the acidifying action of the drug is overcome. Sodium restriction may cause electrolyte disturbances, as well as a disagreeable diet for the patient. The cation exchange resins allow the patient to take an increased sodium intake, but they are bulky, cause nausea, and remove other cations as well as sodium.

J. A. STEWART DORRANCE

Cause and Prevention of Thromboembolism.

OCHSNER, A.: POSTGRAD. MED., 10: 394, 1951.

Between 1938 and 1949 at the Charity Hospital, New Orleans, in more than 500,000 admissions there were 29,494 deaths of which 411 were due to fatal emboli, an incidence of 0.071%. During this 11-year period there has been a progressive increase in fatal emboli—5 per 100,000 in 1938 to 15 per 100,000 in 1949, with a peak occurrence in the fifth decade of life. Slightly more than ½ were on the left side and slightly more

Canad. M. A. J.
Feb. 1952, vol. 66

than 1/3 on the right in pulmonary embolism, and 12.5% were bilateral. The number of cases of thromboembolism corresponds closely to the number of admissions to each hospital service. The rate of incidence of fatal embolism was highest on the gynæcologic service, next on the surgical service, next on the medical service, and lowest on the obstetrical service, this is also true for the incidence of peripheral embolism and thrombosis. Clotting occurs when there is a disproportion between prothrombin and antithrombin. In patients with trauma (major operative intervention) there is a progressive fall in the antithrombin until about the 3rd or 4th day, then the antithrombin returns to normal. The routine use of anticoagulants is not justified because it is far too hazardous. Routine use of venous ligation should not be practised as it does not protect against the detachment of clots. However, a deep vein ligation for a patient with phlebothrombosis is a life-saving procedure. Alpha tocopherol and calcium are apparently safe and do not cause a hæmorrhagic tendency. J. A. STEWART DORRANCE

The Post-Coronary Syndrome.

FLAXMAN, N.: POSTGRAD. MED., 10: 367, 1951.

There are 3 difficult periods for the patient who survives the first 24 hours after an acute coronary thrombosis. The first phase lasts 2 to 18 days, during which cardiac insufficiency, serious arrhythmia, thrombo-embolic phenomena, and shock may occur. The second phase develops when the patient becomes ambulatory and congestive heart failure, angina pectoris, and another coronary occlusion may occur. The third phase—the shoulder-hand syndrome—occurs when the patient returns to work, 4 to 6 months after the initial attack. The complaints are tightness or soreness of the front of the chest, difficulty in breathing on exertion, and weakness or tiredness. These symptoms occur 3 to 4 days after the patients return to work and recall memories of the "unforgettable coronary". He may continue at his work or may remain at home to brood over the feeling that he is finished and unable to work. Work does not aggravate the symptoms which characterize the post-coronary syndrome, nor does it predispose the patient to further attacks of coronary occlusion or to heart failure. The occurrence of these symptoms of the post-coronary syndrome, unless severe angina pectoris or definite cardiac failure is present, is not an indication to advise the patient again to quit his work. Constant watchfulness for definite cardiac failure together with reassurance are the most important means of caring for the patient with the post-coronary syndrome. J. A. STEWART DORRANCE

SURGERY

A Physiologic Operation for Mega-œsophagus: (Dystonia, cardiospasm, Achalasia).

WANGENSTEEN, O. H.: ANN. SURG., 134: 301, 1951.

It is suggested that the large redundant œsophagus of cardiospasm is similar to the lesions of congenital hypertrophic pyloric stenosis and megacolon of Hirschsprung's disease. Heller's operation, in which the muscular and serosal layers of the lower œsophagus are incised is often successful and is considered to be the only other acceptable operation.

This operation is the removal of the redundant lower œsophagus through an upper abdominal and sternotomy extrapleural incision, an extra-mucosal pylorotomy and an open œsophago-gastrostomy. The results on seven patients are described. Œsophagitis is obviated, the œsophageal diameter lessens and the stomach empties satisfactorily. This procedure is advocated for the giant, dystonic mega-œsophagus.

If a few attempts at dilatation fail to cure the earlier case of œsophageal dystonia, the Heller operation should be done. The sternotomy incision is also recommended for this procedure, and digital control through a high gastrotomy makes it possible to do a better operation. BURNS PLEWES

Total Colectomy for Ulcerative Colitis.

GARDNER, C. AND MILLER, G. G.: ARCH. SURG., 63: 370, 1951.

Total colectomy though not recommended as a general cure for ulcerative colitis "is advocated for those patients who, despite the most completely planned medical and surgical care meticulously and enthusiastically carried out, either continue to lose weight and strength or suffer repeated colonic hæmorrhages or perhaps for those who remain invalids despite treatment". Suggestion for this radical procedure, were observations on two patients suffering from fulminating ulcerative colitis, following an ileostomy where before death colonic washings contained about 300 gm. of protein each day, which suggested that this protein loss contributed to the deaths of these two patients. Since this experience they have removed all the colon from the terminal ileum to the distal sigmoid. An ileostomy is performed at the same time. These operations were performed in one stage. Seventeen cases of acute fulminating colitis are reported where a one-stage colectomy was performed, with a mortality rate of 5.8%. G. E. LEARMONTH

Late Results of Surgery in Perforated Duodenal Ulcer.

TOVEE, E. B.: ARCH. SURG., 63: 408, 1951.

This is a follow-up study by a group at the Toronto General Hospital who have been interested in all aspects of the problem of perforated duodenal ulcers. In 1944 this group presented the details of the immediate management of 114 cases. The present report concerns what happened to these patients in a follow-up period ranging from a maximum of five years. The immediate operative procedure used was the simplest and quickest at the surgeon's disposal. The operative mortality was 6.3%. One-third of the 78 patients personally interviewed have little or no trouble with their digestive apparatus now. One-third have typical or severe symptoms of ulcer characterized by pain, nausea and vomiting or bleeding episodes. One-third have undergone further operative procedures consisting of gastrectomy, gastroenterostomy or closure of another perforation. G. E. LEARMONTH

PÆDIATRICS

The Ketogenic Diet in the Treatment of Epilepsy in Children.

LIVINGSTON, S.: POSTGRAD. MED., 10: 333, 1951.

The mechanism of action of the ketogenic diet is still undecided. It is probably due to a combination of the following effects: (1) a slight degree of acidosis; (2) the sedative action of the ketone bodies; and (3) dehydration and the loss of fixed base. This type of diet gives the best result in children between the ages of 3 and 5 years, who have had grand mal seizures and/or petit mal spells of the akinetic type. This regimen is rarely successful beyond the age of 8 years, as it is difficult to keep a state of acidosis and ketosis beyond this age.

The patient is starved for 4 to 5 days, receiving only 800 to 1,000 ml. of water and all anticonvulsant medication is discontinued. By the 4th or 5th day dehydration and ketosis should be evident and the child is started on the ketogenic/antiketogenic radio diet. This must provide adequate calories per day in the proper ketogenic/antiketogenic ratio. This child is on a 4:1 dietary unit for 2 years, this contains 4 gm. of fat and 1 gm. of carbohydrate plus protein. After 2 years the diet is

reduced to a 3:1 ketogenic/antiketogenic ratio. After 2 months a 2:1 ratio is substituted; and after 2 months a normal diet may be started. During the period a child is on a ketogenic diet no carbohydrate-containing medications such as elixirs or syrups should be given. The indications to abandon the regimen are: (1) failure to maintain ketosis, either for lack of co-operation or other reasons; (2) failure to affect favourably the frequency or severity of the seizures; and (3) insurmountable psychologic obstacles in the form of behaviour problems.

J. A. STEWART DORRANCE

Treatment of Urinary Infections in Children.

HELMHOLZ, H. M.: POSTGRAD. MED., 10: 446, 1951.

Pyuria indicates infection of the bladder, ureters, or kidneys, hence one must localize the site of infection, and the infecting bacterium or bacteria. In boys, the foreskin should be retracted and the glans penis swabbed with zephiran chloride, 1:1,000 solution, and the boy is instructed to micturate into a sterile bottle. With a girl, the region about the urethral meatus is swabbed as above and the urine specimen is obtained by catheterization. Treatment will consist of bed-rest, liquid diet, and fluids given *al lib.* to maintain a urinary output of at least 1 litre per day, in infants, and 2 litres per day in older children. If necessary to obtain this volume dextrose 5% in saline may be given intravenously. In infants 15 ml. water every 15 to 30 minutes by mouth while awake will assure an intake of 500 to 700 ml. per day. Large quantities of water will wash out bacteria and their toxins. Urinary retention due to massive pyuria must be prevented. Normal renal function and acid (pH 5.5-5.0) urine are necessary for the use of methenamine, methenamine mandelate, or mandelic acid. Infection due to *P. ammoniæ* responds to streptomycin, 250,000 to 600,000 units per day in four divided doses, in alkaline urine (pH 8.0 or more). Infections due to hæmolytic streptococci or staphylococci respond to penicillin, 75,000 to 150,000 units in divided doses, t.i.d. Combinations of the sulfonamides prevents complicating crystalluria, infants receive ½ the doses for children. The urine becomes sterile in 24 to 48 hours, if there is no response after 48 to 72 hours, none will occur no matter how long the drugs are continued, and another drug should be instituted. Continue sulfonamides for 1 week after the urine becomes sterile. Calcium mandelate administered four times per day assures an urinary pH of 5.5 to 5.0, nitrazine paper may be used for pH determinations. Fluid intake must be maintained at 1,000 to 1,200 ml. per day excluding fruit juices and milk, from the diet. Gram-negative bacilli respond to aureomycin, 50 to 200 mgm., chloramphenicol, 75 to 250 mgm., terramycin, 100 to 300 mgm., all given four times per day. If the infection persists despite repeated temporary sterilization one should suspect an abnormality of the urinary tract.

J. A. STEWART DORRANCE

Various Aspects of Adolescence.

GALLAGHER, T. B.: J. PEDIAT., 39: 532, 1951.

The author stresses the period of adolescence and emphasizes that parents and teachers must consider the importance of this phase of development. Premature or late appearance of sexual characteristics must be taken into consideration when they occur. Mental disorders may appear to be more severe in adolescents than in adults, yet the prognosis is usually very good. School failure may occur during adolescence and there are many causes—anæmia, headaches, conflicts of interests, lack of friends, defective eyesight, avitaminosis, etc. Athletics are an important outlet for excess energy, and here the adolescent learns the give and take of victory or loss. A child with heart disease or diabetes mellitus may play in the goal position in hockey, lacrosse, or soccer—hence he feels he is taking his place amongst his friends. The baffling attitude taken by some toward adolescence may be overcome if one learns about the behaviour attitudes, needs and physiology. Adolescents are people not problems. They are changing into adults.

J. A. STEWART DORRANCE

Electrocardiographic Changes in Exchange Transfusions.

GUSTAFSON, J. E.: J. PEDIAT., 39: 593, 1951.

Eight infants diagnosed as erythroblastosis were given exchange transfusions 2 to 38 hours after birth. All received 500 to 520 ml. citrated, type O, Rh-negative blood in periods of 50 to 110 minutes. The exchange transfusions were carried out via the umbilical vein using the 20 ml. out–20 ml. in method. When indicated by the E.C.G. 2 ml. of 10% calcium gluconate was injected into the umbilical vein after every 100 ml. of blood. Gross muscle tremors appeared after every 100 to 150 ml. blood exchanged. These promptly disappeared when 2 ml. 10% calcium gluconate was injected. Also the heart rate was slowed after the calcium gluconate was injected. In 6 patients the cardiac rate was 90 to 150 beats per minute. After the injection of calcium gluconate the rate would slow rapidly and then rise while the next 100 ml. of blood were exchanged. Muscle tremors and irritability occurred with serum calcium value below 11.0 mgm. per 100 ml. The average calcium level of the citrated blood used for the exchanges was 7.6 mgm. per 100 ml.

The injection of 20 ml. of blood in a newborn infant corresponds to 300 to 400 ml. in an adult. As 20 ml. was sometimes injected in 20 to 25 seconds, right cardiac dilatation could be expected, there was no E.C.G. evidence of this. The authors feel that each 200 ml. of blood should be injected over a 2 minute period.

J. A. STEWART DORRANCE

Nummular Eczema in Children.

PERLMAN, H. H., GROPEN, J. AND WESTFALL, P.: J. PEDIAT., 39: 565, 1951.

The authors present a rather detailed paper on the various names applied to nummular eczema. The lesions are sharply marginated, oval or rounded, coin-like, 1.5 cm. or more in diameter, with pin-point vesicles. These lesions occur most frequently on the dorsal surfaces of the hands, wrists, and forearms, but may occur anywhere on the body. Nummular eczema patches are more regular in outline than atopic dermatitis, there is a sharper line of demarcation between the diseased and healthy skin, there is no lichenification. There is never the terrific itching as in atopic dermatitis, and the scalp is not involved. The etiology is unknown. Nummular eczema responds to one of the tars, oil of cade (juniper tar, U.S.P.), ichthammol, 1.0%, or crude coal tar. During the acute exudative stage wet dressings may be applied (24 to 72 hours), followed by ichthammol or oil of cade 1 to 2% in Lassar's paste.

J. A. STEWART DORRANCE

Aureomycin Treatment of Diphtheria and Diphtheria Carriers.

KARELITZ, S., KING, H. AND RUBINSTEIN, I. S.: J. PEDIAT., 39: 544, 1951.

When patients with acute diphtheria are treated with penicillin and antitoxin the carried rate is reduced by 75%, however, penicillin-resistant strains of *C. diphtheriæ* have developed, even to 2,000,000 units of penicillin per day. This is an added problem in the treatment and control of diphtheria carriers. Thirteen patients with faucial diphtheria and 11 diphtheria carriers were treated with 25 to 50 mgm. of aureomycin per kgm. body weight per day in divided doses, every 6 hours. Every patient with acute diphtheria received diphtheria antitoxin as well. The average time for the throat cultures to become negative was 5 days in comparison with 21

Canad. M. A. J.
Feb. 1952, vol. 66

days when antitoxin alone was used. However, the results of the 11 diphtheria carriers were not so satisfactory. Four developed negative throat cultures in 5 days average, and 4 developed non-virulent strains of *C. diphtheriæ*. Fatal toxic myocarditis was not prevented in one case, while receiving aureomycin. It is felt that aureomycin may be of use in the treatment of penicillin-resistant *C. diphtheriæ* carriers. One strain was resistant to both aureomycin and penicillin, and was cleared with streptomycin. J. A. STEWART DORRANCE

INDUSTRIAL HYGIENE

A Cancer-Control Program for High-Boiling Catalytically Cracked Oils.

HOLT, J. P., HENDRICKS, N. V., ECKARDT, R. E., STANTON, C. L. AND PAGE, R. C.: ARCH. INDUST. HYG., 4: 325, 1951.

Until recently no information was available relative to the carcinogenicity of products obtained from the catalytic cracking of petroleum—a new operation since 1942 when the first commercial unit was put into operation in a company affiliated with the Standard Oil Company (N.J.). In this article which is part of a symposium on a cancer control program for high-boiling catalytically cracked oils, the authors indicate the nature of these products and outline the experimental studies which have been carried out to determine their carcinogenicity. They then discuss a control program in effect in seven refineries where fluid catalytic cracking units exist.

That high-boiling catalytically cracked oils might constitute a potential cancer hazard was suspected. Experimental investigation carried out at the Barnard Free Skin and Cancer Hospital, St. Louis and later investigation at Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York, and then at New York University Post-Graduate Medical School, showed that the high-boiling catalytically cracked oils and fractions of these oils boiling above 700° F. were highly carcinogenic to lower animals (mice, rabbits, monkeys). Available evidence to date indicates that fractions which boil below 700° F. are non-carcinogenic. A subsequent survey carried out in several refineries revealed the large number of employees exposed to possible contact with these oils and therefore exposed to a possible potential cancer hazard.

Studies are being continued to obtain further information and a precautionary program has been instituted in each of the seven refineries. The purpose is two-fold: to prevent contact of these oils with employees and to provide the medical supervision necessary to insure early diagnosis and treatment of any skin lesions which may develop in employees who have been exposed to these oils. Twenty recommendations were made and put into effect, the procedure varying from one refinery to another. These recommendations are outlined in detail, together with the experience of the seven refineries. They are as follows: (1) Restrict number of employees exposed. (2) Make medical examinations every three to six months. (3) Select the employees. (4) Remove employee from exposure if lesion develops. (5) Treat lesions promptly. (6) Wear protective clothing. (7) Do not touch scrotum or face with oil-soaked hands. (8) Remove oil from the skin immediately. (9) Take a shower bath daily before leaving the plant. (10) Put on clean work clothes daily. (11) Provide special facilities for cleaning work clothes. (12) Reduce points of exposure in plant to a minimum. (13) Identify equipment containing these oils. (14) Inform employees of potential hazard. (15) Supervise precautionary measures in each plant. (16) Make a periodic survey of plants handling these oils. (17) Eliminate possibility of inhalation of these oils. (18) Provide the medical personnel and equipment necessary to carry out these recommendations. (19) Investigate blends of these oils. (20) Make reports. MARGARET H. WILTON

Evaluation and Significance of Physical Fitness for Moderate Work. A Study of Patients with Cardiovascular or Pulmonary Diseases.

BBUCE, R. A., LOVEJOY, F. W. JR., YU, P. N. G. AND MCDOWELL, M. E.: ARCH. INDUST. HYG., 4: 236, 1951.

In this article the authors discuss the limitations and the applications of the procedures of evaluating physical fitness in patients with clinical disease. They present data obtained from exercise-tolerance tests of patients with cardio-respiratory disease, a study carried out in order to ascertain the means of differentiating exercise performance of normal and pathological subjects.

One hundred and eighty-four ambulatory patients, 7 to 75 years of age, with symptoms or diseases involving the heart or the lungs, and 75 normal controls, 20 to 70 years of age, form the basis of the report. Grade-walking on a treadmill ergometer was the test utilized and multiple continuous observations were made at three different stresses. Duplicate tests on successive days were done on 15 patients who had hypersensitive cardiovascular disease, to ascertain the reproducibility of results. Ten patients with a variety of disorders, were retested after obvious and definite improvements had followed successful treatment, in order to observe the change in exercise performance.

The method of procedure and the results are presented and commented on in detail. In summing up their findings the authors include the following:

The capacity for moderate work (oxygen consumption increased 1.5 to 4 times) has been evaluated in terms of three fundamental aspects of performance; endurance, efficiency of oxygen uptake, and circulatory recovery. These have been integrated into an index of physical fitness for walking.

Normal control values for several physiological variables, as well as the probabilities of each of these in differentiating exercise performance in known abnormals, have been assembled. The preferred stress for this test was 10%-grade walking at 1.73 mi. per hour (mph) for 10 min.

The oxygen gradient between function alveolar air and arterial blood has been measured during grade walking in 17 patients with a variety of cardiorespiratory diseases.

The significance of the physical-fitness index is that it varies inversely with this oxygen gradient.

MARGARET H. WILTON

PSYCHIATRY

The Early Diagnosis of Schizophrenia.

WILSON, H.: BRIT. M. J., 4721, 1502, 1951.

This article is concerned with those types of schizophrenia characterized by introversion, day dreaming, and less florid behaviour disorders. The cardinal symptom in established schizophrenia is disordered thought. It is wrong to think that the patient is not profoundly upset emotionally at the beginning. Depression and suicide may occur. Three-quarters of the cases begin between the ages of 15 and 30; this may give rise to difficulties of diagnosis, since normal adolescents frequently show behaviour which may be confused with that of early schizophrenia.

Often the home environment is filled with woolly-minded, undependable, if not overtly unstable persons. The body-build is often the thin test-tube type, with cold extremities, and the previous personality is often "schizoid": without emotional warmth, incapable of genuine friendship, either coldly calculating or apathetically ineffective. The patient's cultural background must be appreciated before a diagnosis is made.

The morbid process expresses itself first through a falling off in normal interests and failure of concentration. The patient is aloof and dreamy, may say that things look and seem different and that he feels changed.

If asked how he can explain it, he is either unable to or blames others. He may complain that his thoughts have been interfered with. Derealization and depersonalization are described in curious ways. Thinking is not quite normal but eludes us. Interference with ideation may be shown by four objective signs: thought blockage, failure to answer questions directly, indirect associations and perplexity. Conduct is inappropriate. There may be much procrastination and "idling" and loss of interest in self.

Differential diagnosis includes prolonged and turbulent adolescence (affective sympathy maintained); hypochondriacal anxiety; obsessional states (anxiety and insight into the abnormality of the symptoms); criminal tendencies; slowly developing intracranial disease; hysteria, and depression. Adequate history of the person's past achievements and clinical history is essential.

F. W. HENLEY

FORTHCOMING MEETINGS

CANADA

AMERICAN COLLEGE OF SURGEONS, Sectional Meeting, Chateau Frontenac, Quebec City, Que. (Dr. H. P. Saunders, 40 E. Erie St., Chicago 11, Ill.), February 18-19, 1952.

AMERICAN COLLEGE OF SURGEONS, Sectional Meeting, Vancouver Hotel, Vancouver, B.C., March 31 to April 2, 1952.

AMERICAN COLLEGE OF SURGEONS, Sectional Meeting, Royal York Hotel, Toronto, Ont., May 15-17, 1952.

CANADIAN MEDICAL ASSOCIATION, Annual Meeting, Banff, Alta. (Dr. T. C. Routley, 135 St. Clair Ave. West, Toronto 5, Ont.) June 9-13, 1952.

UNITED STATES

AERO MEDICAL ASSOCIATION, 23rd Annual Meeting, Washington, D.C. (Dr. T. H. Sutherland, 214 S. State St., Marion, Ohio) March 17-19, 1952.

AMERICAN CONGRESS ON OBSTETRICS AND GYNÆCOLOGY, 5th Congress, Netherland Plaza Hotel, Cincinnati, Ohio. (Mr. Donald F. Richardson, Executive Secretary, American Committee on Maternal Welfare, 116 South Michigan, Chicago 3, Ill.) March 31 to April 4, 1952.

AMERICAN GOITRE ASSOCIATION, Annual Meeting, St. Louis, Missouri. May 1 to 3, 1952.

AMERICAN ASSOCIATION FOR THORACIC SURGERY, Baker Hotel, Dallas, Texas. May 8 to 10, 1952.

NATIONAL TUBERCULOSIS ASSOCIATION and its medical section, the American Trudeau Society, Annual Meeting, Statler Hotel, Boston, Mass. (Dr. H. L. Mantz, 1103 Grand Ave., Kansas City, Mo.) May 26-29, 1952.

AMERICAN MEDICAL ASSOCIATION, Annual Session, Chicago, Ill. Dr. George F. Lull, 535 N. Dearborn St., Chicago, 10, Ill.) June 9-13, 1952.

AMERICAN UROLOGICAL ASSOCIATION, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N.J. (Dr. Charles H. DeT. Shivers, Boardwalk National Arcade Bldg., Atlantic City) June 23-28, 1952.

OTHER COUNTRIES

INTERNATIONAL COLLEGE OF SURGEONS, Madrid, Spain. (Dr. Max Thorek, 850 West Irving Park Road, Chicago, Ill.) May 20-24, 1952.

CONGRESS ON DIABETES MELLITUS, the International Diabetes Federation, Leyden, Netherlands. (Dr. F. Gerritzen, 33 Prinsegracht, The Hague, Netherlands) July 7-12, 1952.

BRITISH CONGRESS OF OBSTETRICS AND GYNÆCOLOGY, 13th Congress, Riley Smith Hall, University of Leeds, Leeds, England. (Dr. B. Jeaffreson, The Hospital for Women, Coventry Place, Leeds, Yorkshire) July 8-11, 1952.

COMMONWEALTH AND EMPIRE HEALTH AND TUBERCULOSIS CONFERENCE, 3rd Conference, Central Hall, London, England. (Secretary General, National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, London, W.C.1) July 8-13, 1952.

INTERNATIONAL CONGRESS OF RADIOLOGY, 7th Congress, Copenhagen, Denmark, July 14-19, 1952.

INTERNATIONAL CONGRESS OF PHYSICAL MEDICINE, London, England. (Dr. A. C. Boyle, 45 Lincoln's Inn Fields, London, W.C.2) July 14-19, 1952.

INTERNATIONAL CONGRESS OF DERMATOLOGY, 10th Congress, London, England. (Dr. G. B. Mitchell-Heggs, St. Johns Hospital, Lisle St., Leicester Square, London, W.C.2) July 21-26, 1952.

NEWS ITEMS

ALBERTA

An important step in Alberta's cancer research was marked in October last when some 60 members and guests of the Alberta division, Canadian Cancer Society, attended sod-turning ceremonies for the Dr. John S. McEachern cancer research laboratory.

The honour of breaking ground for the laboratory went to the doctor's widow, Mrs. McEachern. Also present was Mrs. M. A. Daly of Vancouver, a daughter.

The laboratory, made possible by contributions from the people of the province, will be situated north of the medical building on the University of Alberta campus. It will bring together, for the first time, all Alberta cancer research.

The $150,000 building will commemorate the pioneer work of the late Dr. McEachern, first president of the Alberta division.

Tribute was paid by speakers to Dr. McEachern and society at a meeting held in the Conn Memorial Room, prior to the outside ceremony. The actual cost of the building is estimated at $80,000 while $70,000 will be spent on equipment.

W. CARLETON WHITESIDE

BRITISH COLUMBIA

At the annual meeting of the College of Physicians and Surgeons of B.C. a resolution was passed, instructing the Council to ascertain by secret ballot whether the members wished their economic affairs to be handled by the Council, as has been the case for many years, or by the newly constituted, or rather reconstituted, B.C. Division of the Canadian Medical Association. This ballot was taken, and by a substantial majority was in favour of the latter. Accordingly, in future economic relations and problems will be handled by the Division.

This is in line with the practice in other provinces: and will probably result in greater flexibility and more easy access to the wishes of the members, as the Division has a large and representative central body, the General Assembly, with its Executive in control. It is only fair to the Council to point out that the control of economic affairs was forced on them by the failure, on two occasions some years apart, of the former B.C. Medical Association to handle the problem.

Medical economics has become an extremely complicated and difficult problem, and the new Division will have its work cut out for it, to meet and solve

Canad. M. A. J.
Feb. 1952, vol. 66

this problem. It is, rather, a network of problems; prepaid medical plans, relations with Government and the Workmen's Compensation Board, tariff (a whole-time job in itself) and many other considerations must be met and handled. With its larger range of men available to do the work, and with its wider representation, the Division should, and we are sure will, finally be successful in its undertaking.

The Annual Convention of Industrial First Aid Attendants met in Vancouver recently. One of the speakers was Dr. E. W. Boak, chairman of the Industrial Committee of the B.C. Division of the Canadian Medical Association. Dr. Boak expressed the hope that at some future date, preferably an early one, an air ambulance service would be made available by the provincial authorities, for work such as is done in Saskatchewan—and, we believe, only in that province. B.C. is particularly in need of such a service, as so many of its logging and other industries are difficult of access by railroad or other transportation.

The Royal Columbian Hospital at New Westminster has opened a clinic for arthritics, similar to the clinics now operating in Vancouver and North Vancouver hospitals and in other areas of the province. Physiotherapy will be provided free for those unable to pay.

Mr. J. I. Chambers, social services administrator in Vancouver, recently took the opportunity to point out the urgent need for nursing homes for indigent patients. There is a very serious shortage of such institutions, and it is becoming impossible, he said, to find accommodation for indigents needing nursing home care.

This, of course, is one of the problems that has to be worked out in connection with hospital insurance. The need for active beds is so acute that patients who do not actually need acute hospital care cannot be retained in hospital, though it may still be very advisable, even necessary, that they should still have institutional care of some kind.

The maternal mortality rate of Vancouver made a new low record during 1951, according to the report of Dr. Stewart Murray, City Medical Health Officer.

It was 0.48 per 1,000, as compared with 1.16 in 1950, and 1.25 in 1949.

Stillbirths were down from 14.9 in 1950 to 13.6 in 1951, and infant mortality also decreased very slightly, being 22.7 per 1,000 instead of 22.9.

Other points in Dr. Murray's report dealt with communicable diseases—scarlet fever and chicken pox being very prevalent last year. There were three deaths from poliomyelitis. He felt, too, that the mandatory addition of iodides to table salt had been responsible for a sharp reduction in the incidence of goitre in this area.

There has been considerable interest of late in the work being done at Bentinck Island, near Victoria, where lepers have been treated for many years. The results that have been obtained here, with the use of diasone, in the arrest of the disease, have been very striking, and patients are being discharged, and returned to active life. One Chinese patient has recently been pronounced cured, and another, a boy, is expected to reach complete arrest before long. The Chief Medical Officer, Dr. R. B. Jenkins, of the Canadian Quarantine Service, is in charge of the Hospital, and has given very encouraging reports.

J. H. MACDERMOT

MANITOBA

Dr. Elsie Barr, Manitoba 1951, has been appointed resident doctor of McCreary district.

Brigadier W. L. Coke, Director General of Medical Services of Canada has arranged that members of the Faculty of Medicine, Manitoba University, will visit Churchill for two or three days to act as consultants with the regular medical officers at the station.

On December 12, Dr. J. R. Thomson, Superintendent of Victoria Hospital for over 30 years, was honoured at a dinner given by the thirty-five doctors who work at the hospital. Dr. J. Roy Martin was chairman and Dr. Walter Tisdale, on behalf of the group, presented Dr. Thomson with a chair and a footstool. The presentation was made especially in appreciation of Dr. Thomson's work in getting the new wing of the hospital completed.

Dr. Leon Rubin, medical health officer for Rivers and the municipality of Daly, has resigned and is planning to visit England for postgraduate study.

The Minister of Health, Hon. Ivan Schultz, has gone to Europe where he will look into the possibility of getting qualified doctors, nurses and laboratory technicians in Great Britain, the Scandinavian countries and elsewhere to move to Manitoba.

Dr. William T. Fyles, resident in medicine at the Winnipeg General Hospital has been awarded a research fellowship in medicine by the American College of Physicians. He will engage in research work on the use of ACTH and cortisone at the University Clinic of the Royal Victoria Hospital McGill University, under direction of Dr. Bram Rose. Dr. Fyles received his education in Winnipeg schools and graduated from the University of Manitoba.

Dr. M. R. MacCharles, Associate Professor of Surgery, University of Manitoba, will leave in January to travel to Geneva. There he will meet his associates, Professor Combemale, dean of the University of Lille and Professor Heymans, University of Ghent and a Nobel prize winner. The three will set out early in February for Teheran, Iran where they will visit the four medical schools of Iran. Professor Combemale will study the administration of the schools, Professor Heymans will study the training in the preclinical years and Dr. MacCharles will investigate clinical facilities and teaching. In Teheran they will meet a representative of the World Health Organization which is sponsoring the investigation. They will assist him in discussion with the Persian government aimed at working out a final set of recommendations for medical education in that country.

Early in March Dr. MacCharles will join the eight-man mission going to Burma. Each will be a specialist representing a separate field of medical practice and the purpose of the mission is the sharing of medical experience with medical practitioners in Burma. It will be a two-way flow of information.

Mrs. MacCharles will accompany her husband. They will be away for ten weeks and will travel round the world returning to Canada across the Pacific. The best wishes of his many Canadian friends go with Dr. MacCharles who has taught surgery for 26 years at the University of Manitoba.

ROSS MITCHELL

NEW BRUNSWICK

Dr. F. C. Cheesman of the surgical staff of the Saint John General Hospital has completed a refresher course in surgery of carcinoma at the Memorial Hospital, New York. This visit was subsidized by the N.B. Division of the Canadian Cancer Society.

Lieut.-Col. H. B. Bustin has been appointed to command the medical section of No. 102 Reserve Force Manning Depot in Saint John, to succeed Lieut.-Col. F. H. George. Lieut.-Col. Bustin saw service in both Great Wars.

The Saint John Medical Society at their December regular meeting heard a "Cardiac Symposium". Dr. Stephen Weyman discussed "Congenital Cardiac Abnormalities". Dr. A. L. Donovan spoke on "Cardiac Emergencies" and Dr. Norman Skinner reviewed "Drugs in Heart Disease".

A. S. KIRKLAND

NOVA SCOTIA

The Dalhousie Postgraduate Committee brought to a successful conclusion its first year of operation with the visit of Dr. Andrew L. Chute, University of Toronto pædiatrics professor. Dr. Chute addressed members of the provincial profession and gave a clinical presentation to the Dalhousie medical students.

Hitting its stride during the summer of 1951 with the impetus of a Kellogg Foundation grant, the Postgraduate Committee, under the chairmanship of Dr. E. F. Ross, and with Dr. Henry Ross as part-time executive, has set up a program of postgraduate teaching at Dalhousie University and the Victoria General Hospital which is already established as a part of medical life in the province. With its headquarters in the library of the Victoria General and Miss Joan Hudson as secretary, the efforts of the committee extend in several directions. Well established is the practice of bringing an outstanding physician or surgeon to Halifax each month to address the profession there. Regular courses in the medical and surgical specialties, conducted by the staff of Dalhousie and the Victoria General Hospital, are being set up.

Under the broad banner of the postgraduate course committee comes, of course, the Dalhousie Medical Refresher Course which this year celebrated its twenty-fifth anniversary, the oldest and most consistent piece of postgraduate teaching being carried on by the University. Also under the postgraduate course committee is the five week surgical postgraduate course given in preparation for Canadian Certification or Fellowship. The obstetrical-pædiatric postgraduate week, begun as an annual event, has become so popular that it will be held at least two or more times in 1952. The five day course by the department of medicine is planned for March, 1952, and a similar course in general surgery for April. This month the department of preventive medicine is putting on a two day course designed for general practitioners and part-time public health officers to assist in phases of medicine not generally covered in public medical journals and medical meetings. This course stresses practical application of preventive medicine and the physicians' important responsibility in all immunization programs and efforts to improve infant and maternal mortality.

Another effort on the part of the postgraduate committee is to provide visiting speakers from Dalhousie for society and hospital meetings throughout the province. To this end a choice of subjects is offered in the committee's publication *The Dalhousie Post-graduate News* which goes out to every practising physician in the Maritime provinces. This little journal also contains announcement of speakers engaged to visit Halifax, of Committee plans for the future, and abstracts of presentations given in the various courses.

A university lives in the full meaning of its name only when it offers learning to all without distinction of creed or position. With human knowledge, particularly in the medical sciences, becoming so vast distinction between undergraduate and postgraduate must become ever more vague. It is good and a happy thing to be able to watch this movement at the Dalhousie Medical School, under precise and careful direction, move to such an early fruition.

Dr. S. J. Shane, Sydney, N.S., has been elected a Fellow of the American College of Physicians and also a Fellow of the American College of Chest Physicians.

The new wing of the Western Kings Memorial Hospital at Berwick has been opened to the public giving a new operating room suite, case rooms, delivery rooms and nursery. The hospital is now of twenty-eight beds. Special speaker at the opening was Dr. J. S. Robertson, Deputy Minister of Health.

Dr. James A. S. Wilson has returned to his home in Berwick after three years of Postgraduate surgical study in the British Isles.

Reporting at the annual meeting of the Annapolis General Hospital Dr. I. R. Sutherland, President of the Board, stated that the major problem during the year was the maintaining of an adequate nursing staff.

Dr. H. B. Atlee and Dr. Henry Ross of Halifax spoke before the Valley Medical Society at Kentville, Dr. Atlee on "Natural Childbirth" and Dr. Ross on "Handling of Problems of the New Born".

The medical staff of the Halifax Children's Hospital for the ensuing year is: President, Dr. J. W. Merritt; Vice-President, Dr. E. F. Ross; Secretary-Treasurer, Dr. L. Pollett.

Dr. John F. Nicholson after many years of postgraduate work in England and in Valhalla, New York, has returned to Halifax to take up an appointment to the psychiatric staff of the Victoria General Hospital and as Assistant Professor of Psychiatry at Dalhousie.

ARTHUR L. MURPHY

ONTARIO

The federal government has agreed to meet up to half the net cost of operating the new Ontario Hospital at Aurora and the new Ontario Hospital School at Smiths Falls. These two institutions are praised by the minister of National Health and Welfare as "substantial contributions" to the advancement of the care of the mentally ill in Ontario. The Aurora hospital, opened in March, 1950, provides care for 241 patients. The Smiths Falls Hospital School, opened last January, is now accommodating 470 patients and will take in more as wings of the new building are completed and ready for use.

The federal government's share in the operating costs of the two hospitals is estimated at about $327,000 a year.

Radioactive cobalt 60, an isotope of regular cobalt, produced at the federal government's Chalk River atomic pile as the combined effort of the National Research Council and the crown-owned Eldorado Refining and Mining Company has been installed at Victoria Hospital, London, to be used by the Ontario Cancer Foundation. The radioactive cobalt, half the size of a flashlight battery is enclosed in a massive lead case. Heavy machinery is used to direct its aim, the room in which it is used has extra floor supports, concrete walls and a lead lined ceiling. Cobalt gamma rays are directed toward cancerous lesions by Manchester beam direction technique.

Dr. A. R. J. Boyd has been appointed assistant medical officer of health in Toronto. He comes from Kingston where he has been medical officer of health and assistant professor of preventive medicine at Queen's University.

Hon. Paul Martin opened the Atkinson School of Nursing at the Toronto Western Hospital. This is the model school in a five year experiment to improve and shorten nursing courses. Mr. F. J. Coombs, president of the Board of Governors, said the school was the result of a long study which revealed the traditional pattern of training could not meet today's needs.

Canad. M. A. J.
Feb. 1952, vol. 66

The Toronto Branch of the Canadian Cancer Society sponsored a public meeting attended by 1,200 women who heard Dr. Eleanor Percival of Montreal answer questions put to her by women members of the press and radio on phases of the cancer problem which worry the lay person.

Miss N. D. Fidler, director of the Metropolitan School of Nursing, Windsor, has been appointed to the Dominion Council of Health for a three year term. The Council is composed of provincial deputy health ministers along with five other persons representing labour, agriculture, medical research, and English-speaking and French-speaking women.

Dr. Phillips has announced that provincial grants of $8,500 a bed may be made to public general hospitals which can give proper psychiatric treatment. The grants will be available to the larger of the general hospitals, probably to about 60 of the province's 180 public hospitals. The psychiatric beds will be limited to 6% of the hospital's total bed capacity. Out-patient clinics will be held so that the patients can be treated at the community level. They may come for treatment and continue to live at home, or be placed in hospital for a three to six week period. The provincial grant will be supplemented by an existing federal grant of $1,500 a bed. This new plan should decrease the number of admissions to mental hospitals. LILLIAN A. CHASE

QUEBEC

The Provincial Government has sponsored a bill calling for an appropriation of six million dollars to be spent within three years on organizing, building and equipping diagnostic centres beginning in Montreal. The details of the plan are still not clear, but apparently there is to be a moderate charge to patients. There was some criticism from the Opposition on the grounds that no formula has been yet worked out to determine conditions of payment by patients. The building of new clinics was also criticized on the ground that the existing facilities in cities like Montreal and Quebec could be put to better use instead of creating new centres next to existing ones.

It was emphasized that these centres would be for diagnosis only and that the patients would be returned to their family physicians for treatment.

The month of December was marked by the first stages of further development of two large hospitals in Montreal: the Montreal General Hospital and the Montreal Neurological Institute.

The first sod was turned for the new building of the Montreal General Hospital on Tuesday, December 11, by the Hon. Albini Paquette, Minister of Health of the Province of Quebec, and was attended by a large group of friends of the Hospital. From a historical point of view it was impossible not to contrast the ceremony for the first step in the building of the new version of the hospital, with what we know of the laying of the cornerstone of the original building on Dorchester Street. That was 130 years ago, on a bright day in June, and the institution was a small stone and wooden building, which was finished and put into operation in less than a year at a cost of less than $4,000.00. The plans for the new hospital as begun on this winter day in 1951 alone took more than a year to prepare. It is hoped to be ready for occupancy in about two years, and the cost will be several million dollars.

The Montreal Neurological Institute was built in 1934. In the 17 years of its existence its volume of work has grown out of all proportion to its original size, and a new wing is to be added. The contract for this construction was awarded in December. The wing will cost $2,300,000. It will contain an emergency ward designed for use in case of atomic bombing, and it is probably the first Canadian civilian hospital to contain such a ward. Built as the Institute is on the slope of Mount Royal, this special ward is to be in the basement of the new wing, hewn out of solid rock, with a special blast wall on the exposed side.

Dr. Penfield, the director of the institute, emphasized the very generous support of the institution by its many friends, along with the indispensable and increasing aid from the Province of Quebec and the City of Montreal. Increasing support, largely from national and international sources has made it possible to extend the research facilities which are set up independently of the hospital operation, each having its own revenues.

GENERAL

The federal government has undertaken to pay half the cost of compensation which any province may provide for civil defence workers injured in the course of duty or training. This will remove any fear that a civil defence worker may suffer financial loss through accident or injury while training or on duty. Hence, it will wipe out one of the barriers against recruiting for local civil defence organizations. Expenditures are not expected to be large. A similar arrangement was in effect during World War II when civil defence was administered by the Department of Pensions and National Health. A comparable compensation policy has been adopted in the United States.

The federal government here will enter into an agreement with any province to provide that civil defence work, including training, will be considered as employment covered by the provincial Workmen's Compensation Act and that a civil defence worker, not otherwise covered by the Act, who suffers personal injury by accident arising out of or in the course of his civil defence duties will receive compensation in accordance with the provisions of the Act. Whenever a province agrees to accept responsibility for such claims and the cost of any compensation awarded, exclusive of the costs of administration, the federal government will share the cost equally with the province.

NEWS OF THE MEDICAL SERVICES

A meeting of the D.G.M.S. Professional Advisory Staff was held at Army Headquarters, Ottawa, on November 30, 1951. The following attended: Dr. W. A. Jones, Kingston; Dr. T. H. Coffey, London; Dr. T. E. Dancey, Dr. Campbell Gardner, Dr. A. H. Neufeld, Montreal; Dr. J. P. Gilhooly, Ottawa; Dr. Milton H. Brown, Dr. R. A. Gordon, Dr. Ian Macdonald, Dr. Norman M. Wrong, Toronto.

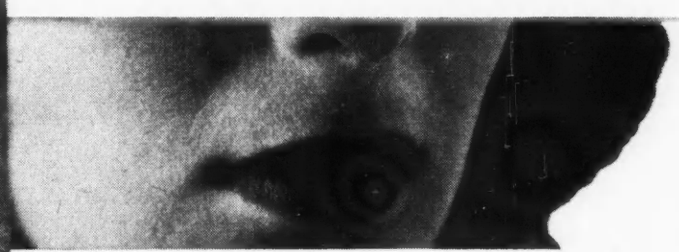
The medical component of the 27th Canadian Infantry Brigade, the 79th Field Ambulance R.C.A.M.C., proceeded to Europe in December under command of Lieut.-Col. R. D. Barron, M.C., R.C.A.M.C.

Lieut.-Col. K. J. Coates, O.B.E., C.D., R.C.A.M.C., Field Training School, R.A.M.C., England, December 4 attended the D.G.A.M.S. Annual Exercises held at the to 7, 1951.

Brigadier W. L. Coke, O.B.E., C.D., R.C.A.M.C., Director General Medical Services of the Canadian Army visited Japan and Korea during the early part of December inspecting the medical arrangements for the 25th Canadian Infrantry Brigade Group.

mild depression

can so easily go unrecognized in everyday practice



Many depressed patients run to their physician with every small somatic complaint *and yet never mention what really troubles them most: their depression*—a condition that so often leads to breakdown, physical as well as mental.

For these patients, 'Dexedrine' Sulfate Tablets is the ideal antidepressant therapy. 'Dexedrine' can be counted upon to restore mental alertness and optimism, to dispel psychogenic fatigue and revive the feeling of well-being.

Smith Kline & French Inter-American Corporation, Montreal 9

'Dexedrine' Sulfate *Tablets*

the antidepressant of choice

Canad. M. A. J.
Feb. 1952, vol. 66

Captain D. G. Guthrie, Montreal, was recently appointed to a commission in the Canadian Army Active Force.

Group Captain A. A. G. Corbet, E.D., Director of Medical Services (Air), visited the Surgeon General, U.S.A.F., in Washington, November 28, 1951 to December 2, 1951, when mutual problems in Aviation Medicine were discussed.

The following doctors and nursing sisters were recently promoted to the ranks indicated: Flight Lieut. K. W. Hampson to rank of Squadron Leader; Flight Lieut. N. R. McGregor to rank of Squadron Leader; Flight Lieut. J. H. Murray to rank of Squadron Leader; Flight Lieut. J. R. W. Wynne to rank of Squadron Leader; Flight Lieut. M. C. McArthur (N./S.) to rank of Squadron Leader; Flying Officer K. J. Henderson (N./S.) to rank of Flight Lieut.; Flying Officer E. B. Butts (N./S.) to rank of Flight Lieut.

Wing Commander E. O'F. Campbell has been appointed Senior Medical Officer in the National Defence Medical Inspection Room where personnel of the Navy, Army and Air Force on the strength of National Defence Headquarters are given any necessary medical attention.

BOOK REVIEWS

MODERN TRENDS IN PÆDIATRICS

Edited by Sir Leonard Parsons, Emeritus Professor of Pædiatrics and Child Health, University of Birmingham. 546 pp., illust. $13.75. Butterworth & Co. (Publishers) Ltd., Toronto, 1951.

This volume is a collecion of twenty-one articles by authors from many parts of the world. This particular volume was edited by Sir Leonard Parsons, and represents his last work, as this work was published shortly after his death. Many of the authors here represented have been students of Sir Leonard's, and Canadians should be proud of the inclusion in this volume of the work of two of our prominent pædiatricians. Many subjects are briefly and competently handled. Dr. Lorimer Dods, of Sydney, Australia, presents the relationship of rubella in the mother to the incidence of congenital malformation in the fetus. He suggests that many more malformations than are now attributed to such maternal disease will, in the future, be reduced by controlling maternal morbidity. Dr. E. N. Allott, Pathologist of the Lewisham Group, London, has contributed a brief and clear review of hæmolytic disease in the newborn. The subject of erythroblastosis is discussed very clearly, and much of the ultra scientific aspects have been eliminated. Dr. John Keith, of the Hospital for Sick Children, Toronto, admirably presents his work on congenital heart disease. Dr. Philip Sandblom, Professor of Surgery at the University of Lund, Sweden, describes modern cardiovascular surgery with a note on the development of the new artificial heart.

Of special interest and importance are the articles of Sir James Spence on poliomyelitis, and Dr. J. H. Ebbs, of Toronto, on nutrition. These works are of general interest, not only to the pædiatrician, but to the general practitioner as well. Dr. Wilfred Gaisford, Professor of Pædiatrics of the University of Manchester, has contributed a particularly important discussion on chemotherapy.

In the opinion of the reviewer this volume is of special interest to the pædiatrician, but several of the presentations are of great value to the general practitioner and the student. The papers are brief, authoritative and up to date. The authors have apparently attempted successfully to be practical, and their eminence in their respective fields recommends this volume to its readers.

A DOCTOR'S PILGRIMAGE

E. A. Brasset. 256 pp. $3.50. J. B. Lippincott Company, Philadelphia, New York, Montreal, 1951.

It has been said that the life of every man holds at least one good drama. Accepting that, the life of the physician with the crises, troubles and joys of his patients woven into its fabric, must offer a hundred. Since he is often a man of broad philosophies and some facility in writing as well, he has made big contributions to current biographical literature. Perhaps every medical man has tucked away in the attic of his memory a dozen tales to embellish the story he may some day get around to writing of his life. Too often the anecdotes overshadow the theme and the autobiography is little more than a series of disconnected reminiscences, interesting but insignificant. Dr. Brasset has not made this mistake. His "Pilgrimage" fulfills Dumas' requirements for drama: it has a beginning, middle and end. He has a good story to tell and he tells it with the simple art of the born story teller. From his internship in Halifax, through the clinical and financial vicissitudes of his first practice in the fishing village of Canso, the problems and successes of Little Brook, the great adventure as resident in neurosurgery and the triumphal return to Little Brook with his mind finally at peace, Dr. Brasset keeps his reader in a state of gentle delight. His humour is simple, kindly, sometimes ingenuous. He laughs only at himself, saving his pity for a few of the many who pass through his pages. His case reports—and what physician's story is without them?—are clear and entertaining for the lay reader in whose eyes the medical profession must gain in stature from this book. But through and about case record and anecdote is always the story of a man with an ideal that shaped itself as he came to know himself. "A Doctor's Pilgrimage" deserves the success it will probably achieve.

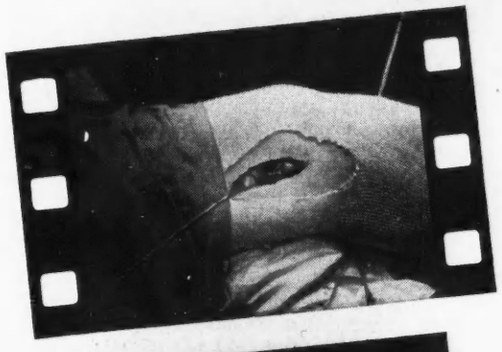
IN A HARLEY STREET MIRROR

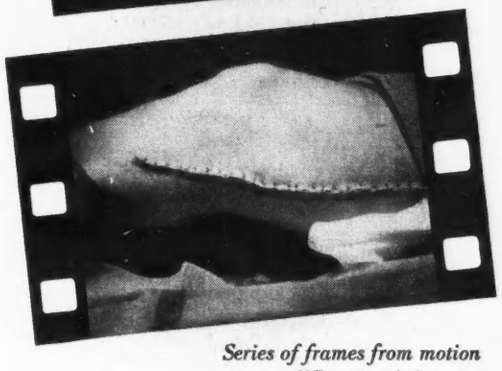
R. S. Stevenson. 278 pp., illust. $3.75. Christopher Johnson, London; Ryerson Press, Toronto, 1951.

The publishing house of Christopher Johnson, whose head is a doctor recently turned publisher, is to be commended for issuing this volume by one of the most gifted and versatile of modern physician-writers. Mr. Scott Stevenson is one of Britain's leading otolaryngologists who has written the history of his specialty and five years ago gave us the biography of Morell Mackenzie which is a classic in its field.

This present volume is one of memoirs in which the author gives glimpses of his experiences in medical journalism, his specialist's life in London, his war-time experiences in Scotland where Rudolf Hess was a patient in his hospital, his impressions of Gibraltar, Spain and visits to this continent notably to the Mayo Clinic. There are fine pen portraits of Arbuthnot Lane, James Mackenzie, Humphry Rolleston and the two famous medical peers, Moynihan and Dawson. As an Edinburgh man Mr. Stevenson also writes of George Cathcart, "Tommy" Annandale, David Wilkie and others. The sketches of Wilfred Trotter and Robert Jones are as fine as anything in contemporary medical literature and are in fascinating contrast to his account of three famous American surgeons—Chevalier Jackson, Harvey Cushing and Rudolph Matas. Finally there is a graceful tribute to the father of laryngology, Manuel Garcia.

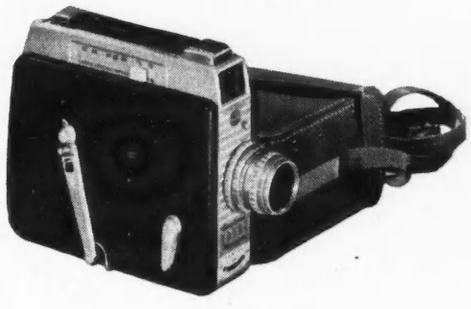
Mr. Stevenson by his art has welded what so easily could have been just another collection of essays into a brilliant memoir full of the light and shadow of life, illuminated by wit and graceful comment, pointed by delightful historical notes. He has here distilled for us something of the elixir of medicine. His book will take its place on the shelf with those select volumes which have created the magic surrounding the word "Harley Street".





Series of frames from motion picture, "Repair of Anterior Cruciate Ligament with Living Tendon (New Method)."

Price subject to change without notice.



Picture the patient

. . . with your own personal motion-picture camera

Cine-Kodak Royal is truly the physician's own. A 16mm. magazine camera, it is precision-made . . . with the optical excellence of a Kodak Ektar *f*/1.9 Lens for sharp and brilliant black-and-white or color motion pictures. It is simple to use . . . with magazine loading and built-in exposure calculator for maximum convenience.

Cine-Kodak Royal may be used to record the details of complicated surgery or, in the hands of the physician himself, it becomes a valued aid in clinical work. (And, incidentally, when the opportunity arises, it can be a wonderful companion on vacation trips.) Price with *f*/1.9 lens, $237.50. Wide choice of lenses and accessories available.

For further information, see your nearest photographic dealer or write:

Canadian Kodak Co., Limited
Toronto 9, Ontario

Kodak products for the medical profession include:

X-ray films, screens, and chemicals; electrocardiographic papers and film; cameras and projectors—still- and motion-picture; enlargers and printers; photographic film—full-color and black-and-white (including infrared); photographic papers; photographic processing chemicals; microfilming equipment and microfilm.

Serving medical progress through Photography and Radiography

Kodak
TRADE-MARK

Canad. M. A. J.
Feb. 1952, vol. 66

GLOBAL EPIDEMIOLOGY

J. S. Simmons, Brigadier General, United States Army, Retired. Dean and Professor of Public Health, Harvard University School of Public Health. T. F. Whayne, Colonel, M.C. United States Army, Chief, Preventive Medicine Div. Office of the Surgeon General, United States Army. G. W. Anderson, Mayo Professor and Director, School of Public Health, University of Minnesota. H. M. Horack, Member of Staff, Dept. of Medicine and Section of Cardiology, Ochsner Clinic, New Orleans. 652 pp. illust., Vol. 2. $17.00. J. B. Lippincott Co., Philadelphia, London and Montreal, 1951.

In 1941, the United States Army organized a Division of Medical Intelligence as part of the organization of its Preventive Medicine Service, to collect and assemble data relating to the medical, health, and sanitation conditions in all regions of the globe. To make this information available to civilians a series of volumes of Global Epidemiology was projected and the first volume, dealing with India, the Far East and the Pacific Islands, was published in 1944. This is the second volume in the series, the delay of seven years being caused by demobilization of personnel and the difficulties of collecting the information—often sketchy and incomplete. The project is monumental in its scope and volumes dealing with Europe, the Middle East and Latin America are contemplated. The present volume deals with Africa and follows the plan of the first volume.

General Simmons and his colleagues undertook a task of heroic proportions when they began the preparation of this series. The first volume indicated that their venture into a virtually unexplored field of medicine and public health promised to be an invaluable contribution to world health and particularly to health in the tropical world. The second volume, which the authors appropriately have dedicated to Sir Patrick Manson whose own work laid the foundation stone of theirs, has more than lived up to that promise, in presenting a clear, authoritative and modern account of the health and communicable diseases of those countries which are no longer exotic.

BASES OF HUMAN BEHAVIOUR

A Biologic Approach to Psychiatry, L. J. Saul, Professor of Clinical Psychiatry, University of Pennsylvania School of Medicine. 150 pp. illust. $4.75. J. B. Lippincott Company, Montreal, 1951.

This book in the author's own words "is designed to provide in simple form the fundamental knowledge upon which modern dynamic psychiatry rests. Its purpose is to give the reader an appreciation of the reality of emotional forces within the mind, their sources in the biology of the organism and something of their relationship to its physiological functioning. It aims also to convey the present day concept of the structure and development of the mind." It is also presented as "an exposition of the biologic basis of psychiatry and hence as an introduction to the basic science of psycho-dynamics". The material, psycho-analytically oriented, is presented briefly and lucidly. There is a section on "Motivation and its Effects", in which it is shown how emotional forces can affect the various physiological processes even leading to tissue damage; and also how these emotional forces can affect preception, thinking, feeling and behaviour. There is also a brief section on the elements of psycho-dynamics under the headings of "The Organism as a Unit", "The Structure of the Mind", "The Development of Mind" and "The Basic Biologic Forces in the Mind".

This book is a small unpretentious volume, very readable and is highly recommended to anyone interested in a straightforward introduction to psycho-dynamics.

BRONCHIAL ASTHMA. ITS RELATION TO UPPER RESPIRATORY TRACT INFECTION

R. J. Whiteman, Hon. Consulting Surgeon for Ear, Nose and Throat Diseases, and Medical Officer-in-charge, Asthma Clinic. Lewisham Hospital. 184 pp. 15s. net. H. K. Lewis & Co. Ltd., London, 1951.

Upon his clinical experience the author reached the conclusion that "upper respiratory tract infection is the main underlying factor of practically all cases of bronchial asthma, and the most important cause of this condition is the neglected common cold". Upon this thesis and without what would be generally considered adequate history or examination, the author proceeded to confirm his premise. Treatment appears to consist of intranasal antrotomy followed by a prolonged period of bed rest (at least 3 months) and inhalation of the vapours of menthol, eucalyptol, lavender oil, and ethyl alcohol. He makes it clear that no attempt is made to avoid specific inhalant or food antigens, and states that after a period of this treatment patients are able to eat foods, and inhale substances to which they were previously sensitive, with impunity. No doubt the author has had considerable experience in the treatment and management of bronchial asthma, and there seems also no doubt that in many instances patients under his management have improved. It is unfortunate that much of the book is difficult to read, the sentences tending to be poorly constructed, and the meaning often ambiguous. Most well trained and experienced physicians will view with misgivings a book which contains such material as: page 71: "there is not the remotest doubt that if, on the morning of the first wheeze, the patient had stayed in bed and inhaled, the cold would have cleared up in a few days, immunity to colds would have been increased, and no asthma attacks would have occurred".

HUMAN PHYSIOLOGY

B. A. Houssay, Professor of Physiology; Director of the Institute of Biology and Experimental Medicine, Buenos Aires, Argentina; J. T. Lewis, Professor of Physiology; Director of the Institute for Medical Research, Rosario, Argentina and O. Orias, Professor of Physiology; Director of the Mercedes and Martin Ferreyra Institute of Medical Research, Cordoba, Argentina, etc. 1118 pp., illust. $18.90. McGraw-Hill Co. of Canada Ltd., Toronto, 1951.

Professor Houssay, in his preface to this book, remarks that Medicine has now passed from the domination of Anatomy and Pathology into the era of Physiology. By this contention, he does not in any way take away from the importance of the other disciplines, but rather attempts to underline the fact that, with the descriptive background which we now possess, the future development of Medicine will depend on the further exploration of function. The author feels that not only must the student receive a thorough grounding in Physiology, but this training must stress basic principles. The scope of Physiology has now largely passed beyond the abilities of one man to encompass, and this raises inevitable problems. Professor Houssay's solution is perhaps the best, his book is a collaborative work of a group of friends and colleagues, all scientists eminent in their own right. With Drs. Lewis (who has incidentally done a very fine job of translating), Orias, Braun-Menendez, Hug, Foglia and Leloir, Dr. Houssay has prepared a remarkably cohesive text. This book is written for the medical student; it does not deal with esoteric facts and, on the other hand, it does not oversimplify and mislead. It is interesting, well written and very readable. This reviewer found the historical notes which are present throughout most interesting as they give the reader

Canad. M. A. J.
Feb. 1952, vol. 66

a feeling of the continuity of physiological investigation and stress the changeability of concepts.

This text should go a long way towards giving the student a useful book which is satisfactory to him and to his teachers.

PHYSICAL DIAGNOSIS

R. W. Brust, Associate in Medicine, University of Pennsylvania Medical School. 294 pp., illust. $4.50. Appleton-Century-Crofts, Inc., New York. 1951.

This work may not unfairly be looked on as a form of apologia, for the author seems to have resolved to try to restore physical diagnosis to its former place of eminence. In support of that resolution he has omitted the invocation of all laboratory aids and has confined himself to an exposition of those methods in which the examiner need rely only on his five senses to learn the correct diagnosis. The arrangement of the book is by bodily systems which necessarily entails some over-lapping. The sequence, however, is orderly enough to follow easily. Most of the signs which have an established value are described and appraised, but some are included that have lost their early glitter or have been shown to be actually misleading. There are also occasional lapses in logic with sometimes needless obtrusion of the author's prejudices, but no one of these defects are serious enough to make the work irritating or unattractive.

Those who have much to do with interns or young practitioners will agree with the author that recourse is often had to the laboratory when the essential information is to be secured only at the bedside. Ours is a "generation that seeketh a sign" and, however lamentable the habit, there is little that can usefully be done to make it less. Furthermore this neglect of physical signs may, in a measure, be traced to the clamor for easier diagnosis because in some conditions, such as cancer of the gastro-intestinal tract, physical signs are not recognizable until a relatively late stage of the disease. Thus the prospect is that reliance on physical signs will decrease rather than increase.

GYNÆCOLOGICAL CANCER

J. A. Corscaden, Professor Emeritus of Clinical Gynæcology, College of Physicians and Surgeons, Columbia University; Attending Gynæcologist, Sloane Hospital for Women, New York. 368 pp. illust. $6.00. Thomas Nelson & Sons, (Canada) Ltd., Toronto, Canada, 1951.

The book is unique in that it argues strongly for early diagnosis and emphasized the overwhelming importance of the cancer conscious physician. There is, however, an unforunate tendency to needless repetition and this detracts from easy reading. The chapter on cancer of the cervix describes radio therapeutic methods in detail and discusses the surgical treatment of the lesion in only a few lines. The great contribution which Victor Bonney made during his life time is not even mentioned. A book such as this should have presented a description of the technique of classical operations. Even exenteration warrants more consideration than it has received. Cancer of the corpus uteri is presented in a very well written chapter and neoplastic diseases of the chorion are adequately dealt with. The description of cancer of the ovary however lacks orderliness but perhaps the unsatisfactory classification of these lesions may account for this.

The book presents so many good features that in spite of the criticism which has been made, it must be accepted as a welcome addition to gynæcological literature. It will take its place as good propaganda, an up to date record of modern knowledge and achievement, and is a well documented reference in the field of gynæcologic cancer.

CLINICAL PÆDIATRIC UROLOGY

M. Campbell, Professor of Urology, New York University Post-Graduate Medical School; Visiting Urologist, Bellevue and University Hospitals, New York. With a Section on Nephritis and Allied Diseases in Infants and Childhood, E. Goettsch, Associate Professor of Pædiatrics, University of Southern California School of Medicine; and J. D. Lyttle, Late Professor of Pædiatrics, University of Southern California School of Medicine. 1113 pp. illust., $21.00. W. B. Saunders Company, Philadelphia, Penna.; McAinsh & Co., Limited, 1951.

In 1937 the author published in two volumes a text entitled "Pædiatric Urology". It was well received and that edition has been exhausted for some years. The present work is a single volume in which the chapter sequence of the former two volumes has been retained. A great convenience in the present volume is a tabulation of subject matter contained in each chapter. Many changes are apparent. An extensive chapter on the adrenals has been added, and a section on the nursing care of pædiatric urological patients. Both of these are well written and informative. As in the previous volumes, there is an extensive contribution on Nephritis and Allied Diseases in infancy and childhood. This section has been re-edited by Dr. Elvira Goettsch. It has been re-written extensively and now includes a section on lower nephron nephrosis and nephrocalcinosis. Many sections of the book show evidence of careful re-writing. Some of the former charts and extensive case histories have been deleted without loss. New illustrations of which there is an abundance have been added. The subject material throughout is presented better and the book is more easily read than the former volumes. The many imporant changes in urology which have occurred in recent years are included. Noteworthy are the almost fantastic changes which have occurred in the treatment of urinary tract infections. The book can be recommended to all those who deal with younger patients. It should be studied carefully by all urologists.

TUMOURS OF THE EYE

A. B. Reese, Attending Ophthalmologist and Pathologist, Institute of Ophthalmology, Presbyterian Hospital, New York. Ophthalmologist to Memorial Centre for Cancer and Allied Diseases, New York. Clinical Professor of Ophthalmology, College of Physicians and Surgeons, Columbia University. 574 pp., illust. $20.00. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N.Y., 1951.

Dr. Reese has compiled this book from the material and background of one of the world's leading eye institutions. It will fill most adequately a long-standing gap on every ophthalmologist's book shelf. The clinical and practical aspects of eye tumours are covered to the satisfaction of the practising ophthalmologist, while both the pathologist and radiologist will find the book excellent reference material. The various tumour groups affecting the eye are presented and their effects on the various eye structures and adnexa fully covered under each group. Dr. Reese has used mostly his own figures and experience rather than the work of previous authors as a basis for his statements and has attempted to simplify the confusing nomenclature while retaining the synonyms for index purposes. Symptomatology, pathology, diagnosis, differential diagnosis, prognosis, and treatment of each condition is well covered in simple direct language; emphasis on the clinical aspect has been applied throughout. Surgical techniques where applicable are well described and beautifully illustrated. The book contains more than 500 plates and at least a quarter of these illustrations are in colour. Every practising ophthalmologist should include this book in his library.

SURGICAL PATHOLOGY OF THE MOUTH

E. W. Fish, Dental Surgeon, St. Mary's Hospital, London; Late Dental Surgeon Royal Dental Hospital, London; Hon. Research Associate in Physiology, University College, London. 463 pp. illust. $10.50. J. B. Lippincott Company, Montreal, 1951.

An arresting preface advises the reader that this text may depart from traditional methods in treatises upon this subject and warns that "It can be given to the dental student either before he reads a general textbook of pathology or after; but it is not meant to replace it".

Good arrangement of subject matter, excellent illustrations and attractive format make the technical aspect of the reading easy. The book abounds in informative accounts of observations which have been derived from comprehensive reading, personal experimentation and the author's long and critical clinical experience. There is however a disposition to explain observations as they are disclosed which is distracting to the reader and which it is felt by the reviewer might in frequent instances be disputed by the reader who has given much time to pondering the problems himself. Therefore the book can hardly be regarded as an "authoritative" text but it is very useful and deserves a place on the shelves of every dentist or experienced student of oral pathology not as a reference book but as one which may be read with an approach partially philosophical as well as "scientific". Accordingly the beginner should not be introduced to the subject by this book but at maturity he may derive much intellectual profit from reading it.

AMINO ACIDS AND PROTEINS

D. M. Greenberg, Professor of Biochemistry, University of California School of Medicine, Berkeley, California. 950 pp., illust. $18.00. Charles C. Thomas, Springfield, Illinois, U.S.A.; The Ryerson Press, Toronto, Ont., 1951.

This is an extensive review on the subject, which is highly recommended to everyone interested in the study of amino acids and proteins. It will be especially valuable to biochemists and research workers in this field. In thirteen chapters the book covers the most important aspects and the new advances on proteins and amino acids. A discussion of all the topics involving a complicated mathematical demonstration is avoided. A long bibliography is included at the end of the various sections enabling the reader to obtain more detailed information. Each chapter is written by a well known specialist in the particular field, the book being a cooperative effort of the author and a distinguished list of contributors. The properties, methods of determination, preparation, isolation and purification of amino acids are fully discussed. The synthesis of labelled alpha amino acids as reviewed in the book deserves special attention. Other interesting sections deal with the determination of the molecular size of proteins, chemistry of anti-bodies, nutritional applications of amino acids and the metabolism of amino acids and proteins which is discussed extensively.

CYTOLOGY OF THE HUMAN VAGINA

I. L. C. De Allende, Chief of the Division of Endocrinology, Mercedes and Martin Ferreyra Institute of Medical Investigation and O. Orias, Director. 286 pp., illust. $7.50. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N.Y., 1951.

This book gives in a simple and understanding way very distinct curves and is illustrated with well-coloured photomicrographs of slides in normal and abnormal cytology of the human vagina. It gives a clear and distinct description of all kinds of hormonal disturbances and is a valuable guide for all clinicians dealing with gynæcological endocrinology.

HANDBOOK OF GYNÆCOLOGY

T. L. S. Baynes, Consulting Gynæcologist, Bolingbroke Hospital, London; Consulting Gynæcologist, St. Peter's Hospital, Chertsey; Consulting Gynæcologist, St. Albans and Mid Herts Hospital. 163 pp. 15/-. Sylviro Publications Ltd., London, 1951.

This book was written not to replace a standard textbook of Gynæcology, but as a companion volume. The author has attempted to summarize his subject in 150 pages, containing 22 chapters. There are no illustrations, and very little explanation of technique of diagnostic procedures or treatment. Much of the material is listed, and readability is decreased.

For one who wishes to memorize instead of understand, such a book may have an appeal. Its value is limited otherwise, because a great deal of reference to larger textbooks would be necessary if a proper appreciation were acquired. If such references were carried out this small "companion" book would no longer be necessary.

MEDICINE AT THE OLYMPIC GAMES

The Canadian Olympic Association is to hold a Symposium on Medicine and Physiology of Sports and Athletics in Helsinki on July 17, 1952, two days before the opening of the XV Olympiad. Doctors and physiologists, including the physicians of the Olympic Teams, are invited to attend and to present brief papers. The Finnish Association of Sports Medicine is sponsoring the Symposium. Canadians interested in attending or presenting papers may obtain further details by communicating with the General Secretary, C.M.A., 135 St. Clair Avenue West, Toronto 5, prior to April 1, 1952.